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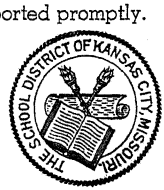

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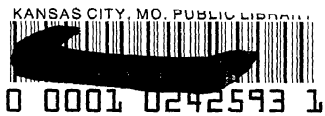
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RQUND THE WORLD WITH *GALATHEA*

By the same author:

LET'S SEE IF THE WORLD IS ROUND

JOURNEY TO THE WORLD'S END

LAND OF THE CONDOR

FROM SANTOS TO BAHIA

THE AMAZON

AFTER YOU, COLUMBUS

THERE SHE BLOWS

ROUND THE WORLD
WITH
GALATHEA

BY

HAKON MIELCHE

WILLIAM HODGE AND COMPANY, LIMITED
LONDON EDINBURGH GLASGOW

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CHAPTER I.

THE Brazilian training ship was giving a dance and her yards and masts were outlined with fairy lights, making her look like a gaudy Christmas tree. Copenhagen's little bronze mermaid sat on her rock gazing dreamingly at her.

On the other side of the channel lay the Danish training ship *Danmark* with lights blazing as she prepared for departure. It was October the 15th, and the evening was still and the sky starry. Few people noticed the slim vessel that slid between those two brightly illuminated ships and out towards the sound. Her name was *Galathea.*

She was the second to bear that name, for in 1845 another corvette also called *Galathea* sailed on a scientific expedition round the world to make a systematic note of strange events, strange beasts and plants on sea and land. Those results and the others obtained by the many expeditions which followed after, put Denmark among the great in the sphere of oceanography.

Occasionally some echo of this work would catch the imagination and interest of the general public, as when Professor Johannes Schmidt solved the riddle of the eel's trek to the Sargasso Sea, or when some hitherto unknown monster with great jaws and a lantern on its nose

was hauled up out of the outer darkness of 1,660 fathoms. But otherwise it passed unnoticed and unreported outside the scientific journals.

The second *Galathea* was going to fish at 6,660 fathoms, and there we stood now on her bridge enjoying the stillness of the night. The engines could scarcely be heard. A faint hum was coming from the funnel, but otherwise the ship was moving through the water without a sound or a quiver. Then came the ring of steps on the companionway from the wireless room. A white slip of paper was handed to the Captain: weather report. Increasing wind. Gale warning for all Danish waters. Storm on the south coast of Norway. It sounded as though they were trying to make fools of us.

But they weren't. When we turned in there wasn't a ripple on the sea, but when we woke with Skagen lighthouse abeam, the wind was howling in the rigging and there was a full storm.

* * * * *

When you are in a comfortable cabin in a frigate of the Royal Danish navy sailing towards adventure at twelve knots, you naturally stretch out your legs, light a cigarette and let your thoughts dwell for a moment on the life you are so rapidly leaving behind you.

Mine went back to a certain day several years before when by sheer chance I had read in one of the evening papers an account of a lecture given in the Royal Danish Aquarium at Charlottenlund. The lecturer had been a man I knew, Dr. Anton Bruun, and he had been talking about sea serpent stories. Now Bruun was a respected scientist and oceanographer of repute; he had

taken part in Professor Schmidt's famous expedition round the world in *Dana*; he had sailed far and seen much. Thus when I read that such a man had publicly stated that he would guarantee that, if you were to fish in the greatest depths of the world's oceans it would yield live creatures in the net such as man had never seen before, I sat up and took notice. When I read on and discovered that he had also said that he was sure that he—given sufficient funds and suitable tools for probing the sub-basements of ocean—would be able to produce creatures that might well have given rise to the myth of the great sea serpent, then I had reached out for the telephone to ring him up.

We met and out of that meeting had grown the *Galathea* Expedition. In those days we had dreamed of a three-masted schooner, but we had got a frigate of sixteen thousand tons. She was the former British ship *Leith,* built in Devonport as official yacht for the Governor of Fiji. After the war World Friendship had bought her and renamed her *Friendship*; then the Royal Danish Navy had acquired her and she had been renamed *Galathea* in memory of the corvette in which Steen Bille had in 1845-47 made the first Danish circumnavigation of the globe with a mixed naval and academic crew.

We had got the money for the expedition from a variety of sources, from the State, from private persons at home, from Danes abroad and from our own Black Market. That, remember, was in the days just shortly after the war when everything was scarce. We solicited gifts from our compatriots living in places where such exotic delicacies as pineapples, bananas, Lucky Strike and Players were to be had, received official permission

to import them and sell them for the expedition fund at black market prices. Eight million cigarettes we sold and they alone brought in well over a million crowns. And the Navy was providing *Galathea*.

The first time the Danish Navy sent a ship out to circumnavigate the globe it invited scientists to accompany her. That was in 1845 when the corvette *Galathea*, Commander Steen Bille, was sent to complete the official transfer to England of our colonies on the Indian mainland, to try to found a colony on the Nicobar Islands, and generally to show the Danish flag up and down the world. Of the two hundred and thirty-one men she had aboard five of them were natural scientists, one was an expert on trade and commerce, one a painter and one a draughtsman. Ever since then the Danish Navy and science have often co-operated and to such good effect that the secretariat of the International Oceanographic Council was moved to Copenhagen.

There will soon be no white patches left on the map of the world. Apart from the desolate ice plateaux of Antarctica there are even now few places that have not been flown over and mapped from the air. Of course there are places in the forest of Amazonas and on the uplands of New Guinea where the distance between telegraph poles and ice cream kiosks is still quite considerable. But civilization has already brushed them, whether it be in the form of government patrols, men prospecting for gold or oil, or of scientific expeditions. We know to what race the native peoples belong, are aware of the basic facts about the country's structure, its

fauna and flora. But otherwise every place is mapped; the great powers have raised their flags on even the most distant outposts, are quarrelling about uninhabited rocks, and apparently are almost ready to go to war over some desolate icefield. A contemporary Rider Haggard would have nowhere in which to site the land of Ophir, and zoologists can no longer dream of finding a prehistoric giant Saurian roaming the forests of the Congo.

Now, two thirds of the globe's surface is covered with water, and of that water half lies at depths greater than 2,166 fathoms. Much of that is unknown territory, as unknown as America was before Columbus. *Galathea,* we hoped, was to be a *Santa Maria* of the sea. We were to be the first in the world to lower our fishing tackle to depths of 4,333 to 5,333 fathoms.

We knew *nothing* about animal life at those depths. That was a field where the imagination had free rein and that is a great attraction even for scientists and certainly for the ordinary person. Was there any life at all at those depths? What did a creature look like when it lived in eternal darkness and under a pressure of one ton on every square centimetre of its body?

At a depth of 108 fathoms there is no light from the sun whatever. At 2,600 fathoms there live creatures of fantastic appearance with lights on their noses or a string of glowing port-holes along their flanks. What was there to be found lower down? Was it empty and deserted at 5,333 fathoms, or would our trawl bring fabulous creatures to the surface? What were conditions of life down there? What was the sea bed like, and what lived in it?

Those were all questions that had to wait till our trawls were hauled in over the rail.

Galathea was given other tasks and duties as well. On her way round the world she was to take routine measurements of the sea's salt content, of the strength of currents and of the water's temperature at various depths. The density of the tiny particles that float on the surface of the water and are of such importance for the well-being of the fish, was to be measured and compared with the number of fish in the layers of water deeper down. We were to determine the water's content of oxygen, phosphates and nitrates. These were all things the world needed to know.

Ours was the ideal expedition ship with the most up-to-date equipment for the scientists. A tip-top laboratory was made aft with easy access to the after deck where the various trawls and instruments would be hauled up by a giant electric winch. It had to be *large* if it was to haul in 40,000 feet of steel wire plus the trawl at the end and the booty which we hoped would be in it. Up on the bridge was an echo-sounder to give a picture of the profile of the sea bed: its plains and mountains and deep valleys, and that profile in conjunction with samples of the sea floor would tell much of geological conditions there.

We had a deep-freezing apparatus to enable us to preserve the creatures we caught that were too large to get into the ship's arsenal of bottles and tubes. There were eleven tables at which as many scientists could sit and work at the one time, and the ship's vibration was so

slight that it was possible to use a microscope at full speed in open water.

The academic world is not in itself national, and so our results were to be made available to all at once. We held that part of *Galathea's* task was to contribute to the exchange of ideas and knowledge with the foreign scientists we should meet during the voyage. Always we hoped, we would have foreign scientists as our guests aboard, persons with special knowledge of the waters we were in and of the problems to be solved at that stage.

* * * * *

Boom—went something above my head, and *boom* it went twenty times more in a row. I dashed up on deck in a fright, for to a mere civilian gunfire means sudden death and destruction.

Smoke drifted across the deck; the air quivered with the explosions. I tried to peer through the mist, but could only see the muzzle flashes from our three guns. Then I woke up and realized that of course we were firing a salute of twenty-one guns in honour of England's glorious flag. And there it was, dangling at the peak and fluttering listlessly in the slightest of morning breezes on a fort that had suddenly emerged to starboard.

Denmark and England bowed and scraped to each other with all the courtesy of days long past, the same number of guns as was fired when the corvette *Galathea* exchanged salutes on putting into Plymouth in 1845. A few moments later a further seventeen shots were fired from our guns on the foredeck, this time in honour of the

admiral who is maritime ruler of England's largest naval base. A speed-boat came dancing over the calm grey water bringing the King's Harbour Master aboard to pilot us to our berth—an honour as great as if the Minister of Transport himself had come to sell us a ticket to Dawlish.

As we berthed in Devonport some of the older men working in the yards nearby gave *Galathea* a nod of recognition. They remembered her from seventeen years before when she was launched there and christened *Leith.* In those days she was intended to serve the governor of the Fiji Islands, and so she did until Hitler started his nonsense. Then she was transferred to the Royal Navy and had other things to think about.

Well, there she was back again and the Navy's guns saluted her return, and she replied with impressive precision. Did anyone ashore realize that her three guns were cast in the naval yards there in 1898?

Then came the visitors: first the representatives of the fleet with orders and medals tinkling and a lot of gold about their swords. After them came the scientists from the laboratory in more informal dress, and in between them the journalists, photographers, B.B.C. people—and the questions. "What do you think are your chances of catching a sea serpent?" "What did your wife say to your going off for two years?" "Do octopi produce their young alive?"

All too soon the visit was at an end and one morning when sea and sky were as grey and melancholy as the walls in the bombed streets of Plymouth, *Galathea* steamed out of the harbour in the invisible wake of

historic ships and set course for Biscay and all the glitter and splendour of the South that lies beyond.

So calm was the weather over Biscay that our scientists decided to challenge fate and stop in the middle for six hours and measure the temperature of the water at 13,000 feet. *Dana* had done that in 1922 and again in 1930. The temperature of the sea at those great depths where the water is affected neither by the seasons nor the caprices of currents can give valuable information about climatic changes. Our third measurement of the sea in this spot showed a slow but steady upward rise in temperature. Where *Dana* had recorded 2.54° in 1922 and 2.60° in 1930, our thermometer now showed 2.72°. To me that was a steady rise in temperature, but so sceptical are scientists that they are not prepared to accept that as a sign of a permanent change in the climate of the northern hemisphere, until the rise has been measured at regular intervals for another three or four centuries, by which time it will have lost most of its interest for you and me.

Off Finisterre a dozen little song birds alighted on the deck; birds of passage like ourselves, they were grateful for a lift that allowed them to rest.

It was a lovely mild night with a gentle swell running from the west and sparkling bright stars. In a day or two the moon would be full, and the Portuguese sardine fishers were very busy hauling the leaping fish aboard their crescent-shaped boats in dilapidated nets.

Lisbon is a pretty city and it has considerable charms. Like Rome, it lies on seven hills, but while it is seldom you are aware of that strange arrangement in Rome

where the city is perched on either side of the narrow Tiber, you cannot help seeing and admiring its effectiveness in Lisbon with the city rising like an amphitheatre from the breadth of the river Tejo. In Rome the houses are of dull brown colours, but Lisbon is gay and garish like a stage set, and not content with that they have decorated many of the façades with pretty tiles, and set stones of various colours in intricate masonic patterns as pavements for the plazas and avenidas.

On the first part of our voyage we were to sail in the wake of Henry the Navigator and Vasco da Gama; *Galathea* was to follow the route round the south of Africa where the Portuguese showed the way five hundred years ago. Thus, it was natural that we should pay a visit to the lovely Jeronimo monastery beneath whose arches Vasco da Gama is buried alongside the sarcophagus containing the bones of his friend, the great Portuguese poet Camoens, whose songs would have kept da Gama's name alive through the centuries even had his contribution to exploration been forgotten.

The church in which these two friends lie at rest along with others of Portugal's great is in its magnificence itself a monument to Portugal's age of greatness—with lovely wood carvings and everything inlaid with gold and silver brought home from India and Brazil, lands that Portugal's great sons first put on the map.

As we slipped down river on our way to Teneriffe the broad Tejo was alive with fishing boats with red sails and heavily laden freighters, broad bowed and clumsy to look at but fantastically good sailors. They

make their way in and out among the steamers without a motor, using just a huge swelling sail; the method of manoeuvring them is as primitive as that of their cousins, the Arab dhows, for they have only a tiller to steer by, heavily laden as they are with a pile of wine casks, bales of cork or fresh caught sardines from off the Portuguese coast. The Portuguese have not forgotten what their ancestors learned when they worked the ships of Vasco da Gama and Magallanes.

We reached Teneriffe early one morning before sunrise. The heavens were blue, and only over Pico de Teyde was spread a veil of cloud. I knew, however, from previous visits, that as soon as the sun was clear of the horizon the clouds would slowly withdraw and Pico would be visible in all its pink loveliness.

We drew in nearer and nodded good morning to the bobbing little fishing boats. Then we got ready to make the entry expected of a naval boat. Our gunnery officer, Prince Flemming, stood ready at the guns with his men, the Captain was on the bridge in his white uniform, and a quarter-master was standing by to hoist the Spanish flag.

It was then that catastrophe was averted. But how near it was!

As the First Officer walked past he noticed a stripe of mauve in the rolled-up flag which was to unfold as the first shot of the salute was fired—and mauve was not the colour he had expected to see on the Spanish flag. Swiftly the flag was rolled out—and proved to be the Spanish Republican flag: the red, yellow and mauve that had fluttered above the government troops when

the previous military governor of Teneriffe started the civil war. That combination of colours had not flown from any Spanish flag pole for thirteen years.

With that discovery things began to happen. Our most excellent tailor was torn from his work and lugged with the sewing machine on deck. A number of signal flags were pulled from their cases till one was found, that for B, which was bright red; off this a strip was cut of the correct width while someone else ripped up the threads of the mauve strip on the old flag. The sewing machine whirred with the First Officer at the wheel and the gunnery officer pulling the cloth from under the needle, and so the republic's flag was transformed into Franco's flag. Five minutes later that masterpiece went to the top and was saluted with twenty-one guns.

To have put into Santa Cruz harbour with the old flag flying and the guns saluting would have made as good an impression on the authorities ashore as if a ship were to put into Murmansk with the old Tsarist flag at the main top. So now you know how it was that a tailor saved Denmark's honour off Teneriffe.

Among our many invitations was one from *Masa Corral*, the local folk dance society. They were giving an entertainment that evening and all who could get shore leave made their way to the big hall in the middle of the town. There a score of young people in colourful costumes came dancing across the floor to the accompaniment of eight stringed instruments, and for an hour we sat spellbound by the rhythm and colour. Male and female voices alternately took up the rhythm and played with it, while the dancers whirled round and round in

a dance that was as Spanish as it was not. In the centuries that have passed since the Canary Islands came under Spanish rule they have had time to develop their own music, songs and dances. Like the national costumes they are a hotchpotch of the folklore of all the provinces of Spain.

When the performance was over and the inevitable speeches had been made, the president of the society told the visitors that the orchestra would now play dance music of a more familiar kind and that none of the lady dancers would say anything but yes to an invitation from a Danish blue jacket.

A dozen girls with black eyes and narrow hips are not many for fifty sailors and marines. The dance began in the best of international understanding—language and dance steps apart—but the Dane's interest in the proceedings cooled noticeable as they became aware of the fact that round the walls of the hall sat a solid phalanx of mothers and aunts with shawls drawn over their shoulders, moustaches on their lips and piercing dragon's gaze directed at each of the dancing señoritas.

"That one's got a tommy gun under her shawl," said the mess-room boy to the laundry boy, and they went full speed astern and put a no-man's land of at least eighteen inches between the stripes of their collars and their señoritas' billowing bosoms.

One by one people found they had things to do elsewhere or that it was high time to get to bed. Viking vitality and northern energy withered before the watch-

ful gaze of Teneriffe's mothers and aunts. Before half an hour had passed the dance floor was deserted.

In the big plaza with its grey-green plane trees an unpleasantly white light poured down over the tables and chairs of the open air restaurants where white-jacketed waiters brought ice-cold coca-cola to thirsty clients, while a gigantic loudspeaker ceaselessly blared forth the latest American jazz.

You could not hear the cicadas' evening song, but it was a warm night and the air was filled with the scent of flowers. In the electric light bloomed Christmas roses, blood red and showy, yellow cactus blossom unfolded and bougainvillea poured sacks of blossom over every garden wall.

At midnight the pilot came aboard, the moorings were cast off and *Galathea* drew away from the quay.

We could see the lights of Teneriffe all through the dog watch. Then the last vestige of Pico de Teyde's soft shadow vanished.

* * * * *

Between the Canary Islands and Dakar we tried out our equipment. There was little scientific purpose in fishing there, for those waters have been investigated again and again, but we had to have some practice before our work began in earnest. So we fastened three trawls to our miles of wire and let them disappear astern just as the last pale gleams of day were disappearing from the sky in the west.

The first bag-net slid into the phosphorescence and 1300 feet of steel wire ran out. Then the winch was stopped, the next bag-net was firmly attached to the

wire and ten minutes later a further 1300 feet of wire had run out over the stern. The third and last bag-net was then attached and lowered 1300 feet in its turn. Half speed ahead—and so *Galathea* hauled her three huge butterfly nets through the eternal night that reigns 316, 433 and 650 fathoms down. We trawled for an hour before beginning to haul in. Of course, we were excited and slightly nervous. For Dr. Bruun it was sheer routine, but for the young students and the others who had not done oceanographic work before, a successful outcome of the trial meant their first encounter with a new world, one that they had only been able to meet in dry diagrams and scientific papers, flat drawings of fabulous creatures with lights on their noses.

The first bag-net appeared. Empty, said the youngsters leaning half over the rail to heave it in. But it wasn't really. The second and third bags looked equally empty, but, like the first, investigation of the little bucket fixed at the very bottom of the net showed that each swarmed with life.

The contents of the buckets were emptied into wooden tubs and taken to the laboratory. There the contents were sorted, placed on white flat trays and examined under the daylight lamps.

Deep-sea shrimps are flaming red like a cardinal's cloak, the most concentrated colour an artist could dream of having on his palette; when threatened, they use the technique of the cuttlefish which they have adapted to conditions where darkness reigns and where the sepia-coloured smoke-screen of the cuttlefish would be rather ineffective as a hiding place. Instead, the

deep-sea shrimp emits a shower of gleaming, glowing dust, a firework display of sparks that dazzles a greedy opponent in the dark in the same way as a ruthless car driver can make oncoming traffic helpless with his headlights.

Alongside the red shrimps lay jelly fish patterned with delicate colours and curves—what a source of inspiration for a designer of carpets?—and eel larvae of all sizes, transparent creatures with just a fine skeleton to show that one day those clear worms would develop into the strange creature that ends it vagabondage on a flat plate surrounded by boiled potatoes.

Among the shrimps, eels and jelly-fish lay two or three representatives of real deep-sea fish such as we knew them from the books. The largest was only four inches long, but each was a glimpse of the fantastic world that lay beneath our keel. Deep black they mostly were.

Grotesque toadfish with lights on their noses, eel-slender monsters with jaws so huge that they could swallow fish several times larger than they, fish with needle-thin light elements patterning their velvet-dark sides, luminous port-holes, little glowing stars from the night down there.

"Nothing special from the biological point of view," said the more experienced of the scientists. "Not one unknown species, as far as we can see," said Dr. Bruun.

But as far as the others were concerned work had begun.

CHAPTER II

THE dark Continent wasn't dark at all. There it lay in the heat haze rather like a low Danish beach in the summer sun.

Most people expect something more dramatic when they first see Africa's coast emerge out of the haze, something exotic—for example a few giraffes sticking their heads up over the lighthouse and some medicine men dancing on the beach. But we did not see one giraffe while we were in Dakar, and the only medicine man we saw dancing was our own ship's doctor who was an ardent entymologist.

Dakar lies behind Cap Verde, the most westerly point of Africa, but a hundred years ago there was no place of that name at all. There was just a fishing village beside a beach on which the swell breaks in swirling foam when the desert wind, the Harmattan, blows out over the Atlantic.

On an island in the lee of Cap Verde—Isle Gorée—lay a cluster of houses with a strong Portuguese character. In their day they had been used as a place of assembly and despatch for slaves intended for the sugar and cotton plantations of the West Indies, Brazil and the Southern States of America. Those days had been over for a good hundred years. Slavery was a thing of the past, and shipping along the coast of Africa had grown con-

siderably since Henry the Navigator and Vasco da Gama had first groped their way south. Colonies had been founded up and down the coast; English Dutch, French, Swedes, Portuguese and Danes had been struggling for the fattest titbits and the most strategic points, first to ensure the rich profits that were to be made out of the traffic in slaves and later as emporiums to trade in the valuable and scarce goods that the huge African hinterlands were able to supply.

Ships of the various African trading companies or of national fleets criss-crossed the gulf of Guinea on their way to the Ivory Coast or Gold Coast, to the ports lying at short intervals along the shore, and to the factories where goods were assembled and money made.

The old sailing ships did not depend on intermediate ports between homeland and destination in the same way as ships do to-day; if a sailing ship did happen to run short of water or provisions, she could go ashore where she liked on a desert coast and the crew could fill the butts with spring water and the larder with game. When motors took the place of sail, ships became less independent, and as the new worlds became more and more colonized, it was no longer possible to go ashore just wherever you liked. Thus the towns lying on the shipping routes got a new lease of life. As long as they had a pier for shelter, a dredged channel and a stock of coal, they could reckon on steady income even when the surrounding country was golden desert or sourest swamp where nothing could live.

Dakar was founded in 1862. To-day it is not only one of the most important harbours on the west coast

of Africa and fourth largest under the French flag, but it also acts as a sort of "D.C.", having a position corresponding to that of Washington in U.S.A.

Dakar district is an enclave in French West Africa. It lies in Senegal; but from its government buildings threads go to all the French colonies in Central Africa. From them are ruled not only Senegal, but French Guinea, Ivory Coast, Dahomey, French Sudan, Mauritania and Niger as well, an area more than one hundred times the size of Denmark but inhabited by only four times her number of people, and of that population 32,000 are whites. Each of these colonies has its own governor and budget, but they also have a governor-general and a common budget, which is administered by a Colonial Council composed of five representatives of each territory.

Dakar is the residence of the governor-general. From being a sandy beach in the lee of Cap Verde it has become a city with 100,000 inhabitants. Shipping started its growth and groundnuts completed it.

In French West Africa the cultivation of groundnuts has been systematized. Before the season begins each native cultivator receives nuts for sowing. They are distributed through the local chiefs to all who apply. The cultivator pokes small holes in the sandy soil and plants the nuts as we do potatoes. That is done in July after the first rain has fallen. Then he sits back and lets the rain pour and pour. In the latter half of October, he digs the nuts up, dries them in the sun and takes them to the village where he hands over to the groundnut committee as many nuts as he was given for seed. The

rest are sold. The normal yield is thirty to thirty-five fold.

This cultivation of groundnuts is not a very complicated business, so the women are made to do most of the work. If they can't get it all done, then the men just have to get themselves more wives.

The Senegalese are mostly Mohammedans, and as there is great demand for groundnuts, many of them are prosperous Mohammedans. You can see that by the people in the streets of Dakar.

It is said in Dakar that thirty per cent of the negroes are *very* prosperous and seventy per cent *very* poor. The poor ones live in Medina, the native suburb of Dakar. But it isn't such a dreadful thing being poor in Dakar—at least not until you have got so far along the road of civilization as to have ambitions. A few square yards of corrugated iron or plaited straw to act as a roof and provide protection from Our Lord's fiercest sunshine and most violent rain, a patch of flat ground in the shade of a mango tree, a cloth to tie round your loins out of consideration for the few whites who come to Medina, a handful of rice, a bunch of bananas, a few groundnuts and a ripe mango dropping into your lap from your shady tree—what more could man want?

It is not till you begin envying your neighbour his white shoes with rubber soles or the man opposite his patched umbrella, that life's troubles begin, those that lead to despair when you see that one neighbour has a dozen more bottles of champagne in his cellar than you have, and a car that is a year younger than yours. The inhabitants of Medina have not yet reached that stage.

Copenhagen
Plymouth
Lisbon
Tenerife
Sahara
Nile
Dakar
Niger
Kumasi
Takoradi
Sekondi
Monrovia
Victoria
Accra
São Thomé
Congo
Nairobi
Mombasa
Kilimanjaro
Zanzibar
Luanda
Lobito
Zambezi
Diego Suarez
Madagascar
Walvis Bay
Beira
Johannesburg
Durban
Capetown
Simonstown
GALATHEA
15·X·1950–25·III·1951

But it will come, for after the war France gave her black citizens in West Africa the same rights as the white, and the possibilities of advancement are unbounded.

For the time being Medina still cares nothing about that.

* * * * *

The blackest negroes are those in Senegal. The blackest of the Senegalese seem to have collected in Dakar. And the blackest of the black negroes clothe themselves in colours so incredibly violent that all those nature has created appear grey and dull in comparison.

Never had I imagined that green could be so glaringly green or that yellow could do such violence to your eyes. Ordinary red is muddy brown and the Mediterranean is drumly when compared with the reds and blues of the kerchiefs with which the negroes of Dakar top their symphonies of colour.

Blue, mauve, green, carmine—decency forbids such reckless association with colours of such heady calibre—but the negroes of Dakar have never heard of the theory of colours, and if anyone tried to explain it to them, they would just bare their teeth in a delighted grin and slap in a little orange and canary-yellow for good measure.

And believe me—theory or no theory—it is a pretty sight when the sun is shining after the rain to see thousands of gay, black negroes promenading their Sunday clothes along the broad avenues of Dakar.

The men and women are tall and well built, with long limbs and well modelled faces with soft rounded lines. The women's curly hair is arranged in ingenious

twists, greased with coconut oil and plaited into jutting tails beneath their colourful kerchiefs. In among their hair they stick glittering gold coins and shining jewellery which bear witness to their prosperity and lovely barbarian culture. The whole effect is so overwhelmingly pagan and violent that you get a shock when you see your own miserable little self in a shop window; what a pallid caricature of what man was intended to be when God created him in his own image on the sixth day.

The men compete with the women in imaginative colouring. They dress themselves in sack-like smocks that trail in the dust and billow out like balloons at the least puff of wind; they wear kaftans and loin cloths, and on their heads they have glaring red fezes, conical, coarsely plaited straw hats, knitted caps with stripes and squares—and, of course, here and there a white tropical helmet topping a coal-black face whose eyes are framed by huge spectacles with broad white rims.

All the colours meet in the market-place, which is as crowded as an ant-heap. Here you can buy groundnuts, coconuts, mangoes, bananas, oranges, meat, fish, cakes, strange liquids and mysterious powders; Mohammedans sit fumbling with leather rosaries furnished with tassels, little naked kids try to snatch handfuls of nuts, and on the roofs round about impatient vultures stretch their naked necks as they wait for their time to come. You see women suckling their children with expressions of bliss in their black eyes, and others with gigantic calabashes on their heads and a little child fastened on their backs with a gaudy cloth. Elderly gentlemen walk beneath open green umbrellas with

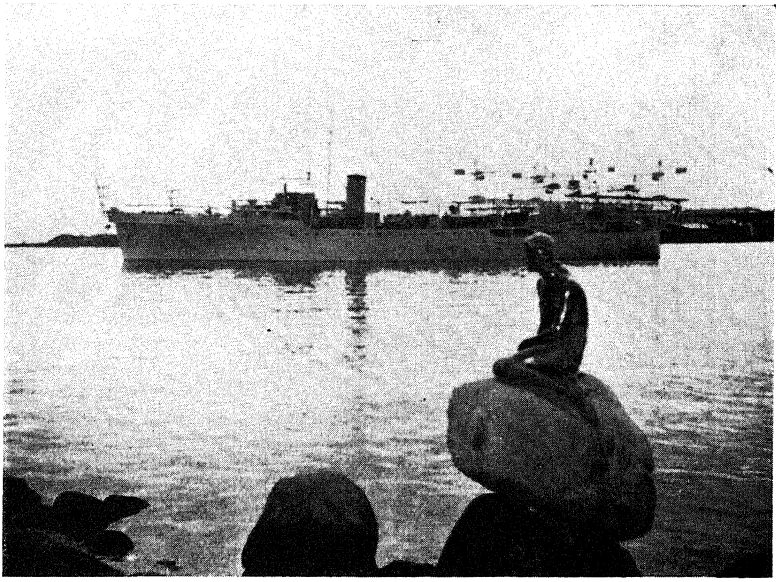
long woollen scarves round their necks, apparently ignorant of the fact that the temperature is around 97° Fahrenheit in the shade. There are bareheaded Arabs with bristling frizzed hair and long wispy beards stiff with the dribble and dirt of months—women with bundles of dried skins on their heads making for a store by the quay.

Negroes on bicycles—red, green and blue bicycles with chromium plating and three-speed gears, with a burnous fluttering out above the back mudguard and a wobbling straw hat on their heads.

Braying donkeys; a flock of hoo-ing monkeys in the top of a carob tree; girls, very young, slender and graceful, most with one black shoulder bared and the other covered with the gaudiness of their kerchiefs—coquetry, conscious or unconscious, but effective and picturesque.

We have caught the African negro in the net of our civilization, and we have taught him that it is sinful and criminal to walk naked in the sun; but how he has cheated us! He has taken the silks and cottons of Lyons and Manchester and with them made clothes the effect of which is even more barbaric, more pagan than his previous nakedness.

Nor have we been able to increase the tempo of his living. It is the white man's daily headache that his black subordinates cannot realize the importance of production and wages being increased by working harder. He cannot understand that there are people who prefer sitting on a step philosophizing about life and sucking at a piece of liquorice root or an old pipe, to standing behind a rational machine earning a wage



Galathea sails out from Copenhagen, 15th October, 1950

Picturesque craft in Lisbon Harbour

At a reception in Liberia the members of the Expedition had to line up while the country's ministers and officials walked along shaking hands with each. Here is the author receiving a ministerial handshake

that is princely in comparison with what the negro can scrape together doing occasional odd jobs, if he even cares to do as much.

It is irritating for us Europeans that we cannot get it into those curly pates how much better is it for society and humanity if man wears himself out working so hard in the tropical heat that he is able to retire with a fortune when he is unable to enjoy it.

The negroes are so incredibly stupid.

* * * * *

The road out to Dakar's airfield is as modern and excellent as the airfield itself. It is designed for traffic travelling at seventy miles per hour.

In the middle of the asphalt Africa had settled itself. A negro in a burnous and with a fez on his head had seated himself on a wooden case painted white and unwrapped a piece of bread from a newspaper parcel. On the carriageway lay a piece of sausage and a clove of garlic. He was intending to have his lunch there—and he did.

Cars and buses bellowed their indignation, but Africa was blind and deaf to that sort of folly. Drivers had to take their foot off the accelerator and mount the cyclists' track to get round him.

Alongside the road wandered goatherds with long-horned cattle and goats. The ground round about was studded with thick-bellied bao-bab trees standing where they had stood for a thousand years. It is said that bao-bab trees can live for 5,000 years.

The trees on the sun-scorched plain round Dakar airport see many strange sights. In the little huts along-

side the road coal-black mammies go about their daily tasks without ever a glance at the gleaming gigantic insects buzzing above their heads. You need to concentrate while pounding millet into flour in a wooden mortar with a club for a pestle. The sun brought out a golden highlight on their naked shoulders.

In the villages down by the shore—N'Gor and Yoff—people didn't have time for gaping at aeroplanes either. They were very busy hauling antiquated fishing-boats into safety up the dazzling white sand on which transparent blue waves were breaking in crystal surf. Naked children were playing with starfish. There was a wonderful fresh breeze off the sea.

A Cloudmaster landed lightly and easily on the runway. Neither pilot nor passengers realized that one of its gigantic rubber wheels crushed the head of a green mamba, as the 'plane taxied up to the arrival hangar. The green mamba is one of the most poisonous of African snakes, and there are numbers of them at the airfield. They have had sense enough to withdraw from Dakar and district, but there with quixotic courage that does nobody any good they will plunge their fangs into the rubber of the tyre just before it crushes their heads. When darkness falls, the jackals come creeping out to see if the refuse bin from the bar contains anything edible, and the hyenas laugh hoarsely and stupidly somewhere under the bao-bab trees, restlessly blinking at the floodlights that are lit before the 'plane from London or Rio touches down.

Such is Dakar.

Jacob was a monkey. He came aboard when Joseph died. Joseph was a chameleon. He lived in an empty aquarium with two large scorpions, a slow-worm and four rhinoceros beetles larger than mice. The natives and kindly Europeans had brought us all sorts of intriguing things after reading in the paper that we were a *scientific* expedition. They even brought us a horned snake, but luckily it was dead. It had two projecting warts on its nose—hence the name—and ten c.c. of opaque poison that is instant death in its glands. The scorpions had peevish natures and were continually squabbling, but the chameleon was much nicer. He kindly changed colour every time we moved him from one book to the other. We could get him to go tartan by putting him on a wire grid, and he went spotted, like a leopard, on the marbled endpapers of the cash book. But he wouldn't go red. We tried everything from the most delicate pink to flaming vermilion. He just looked at us appealingly and refused to change.

Like all chameleons Joseph had the great advantage of being able to move his eyes independently of each other. It looked as though there were no connection between them. When the one eye looked upwards and to starboard, the other could be watching the least little movement being made to port. Unfortunately he died of ether poisoning, and now he is in the zoological museum.

No. 3 in particular mourned him. He had borrowed Joseph and was using him to catch flies in his cabin. He was wonderful at that. He sat on the ceiling quite still, then suddenly spat out his tongue in the direction

of the fly. He never missed. Then he whistled his tongue in and it obediently returned home with its booty.

We as an expedition, were not yet acquiring booty, but we had begun work on a small scale. We were still in waters that were known inside out, so apart from some zoological research little was done. Our hydrographic work, however, was in full swing and so was Professor Nielsen's measurement of light at various depths.

We were growing accustomed to the apparent confusion in the faculties. Steemann Nielsen was professor of Botany and to our childish intelligence ought to have been counting stamens on orchids, instead of letting mysterious instruments down twenty-five fathoms, gazing long at a photo cell and then writing down a lot of figures.

Then we had two meteorologists, State meteorologists at that, but instead of forecasting the weather for the crew's outings they submerged queer instruments to depths of 2,600 fathoms to measure the temperature and salt-content of the water at those—to the general public—inaccessible depths.

Questions elicited the fact that Professor Nielsen's job was to determine the plant physiological condition of the sea—whether the tiny plants that constitute the food of the small fry of the surface water were sufficiently numerous and nourishing to supply large numbers of fish, or whether the area in question was one of those which are poor in fish. One day those

investigations will be of benefit to the fishermen of Yarmouth, Bohuslän and Yokohama.

One day our excellent paymaster Clementsen was sitting doing his accounts while on the boat deck overhead the scientists were busy hauling a shark aboard. The shark was very dissatisfied with its change of milieu and was hitting out hard with its tail as they hauled it up the side. When it reached the level of the main deck it gave an extra flip and stuck its head in through Clementsen's port-hole and spat a half-digested herring in between the pages of his ledger.

Clementsen gave it a stern look, picked up the telephone and rang the laboratory:

"Report a *Carcharhinus falciformis*. Fine, young specimen with perfect set of teeth, wedged in the sternmost port-hole. Are you interested?"

They were. All sharks were interesting, not in themselves, but because of their pilot fish and parasite fish which were wanted for closer study.

A few days later we turned our backs on the Atlantic and turned the corner towards the Bight of Guinea. Before sailing further down that notorious coast, from which thousands of negroes were dragged as slaves and shipped to the West Indies and the Southern States of America, we were to pay an official visit to Liberia, the State that was founded a hundred years ago by freed negro slaves who had gone back home.

We had come south of the belt of the Trades and the weather was thoroughly reliable. A swell running southward rocked us gently. Occasionally a thunderstorm passed across the northerly horizon with a

sparkling display of lightning fireworks above the jungle. Then one morning we saw the coast of Liberia ahead—as flat as a pancake. Only at one or two points was there a sort of hump on the shore line and on those heights a lighthouse and a smear of houses had lodged themselves. One of those was Monrovia, the capital of Liberia.

Until a few years ago Liberia's capital had no harbour. You had to go ashore through the surf in the natives' canoes. Now the Americans have built a couple of moles, dredged the sea bed between them and built a cement quay and a melancholy warehouse of the same material. So now Liberia has a modern harbour, and even the veriest land-lubber will realize what that signifies for the well-being of a country.

The guns of the fortress answered our salute and we went alongside the quay. The Danish Consul came aboard. He was a barrister of the Supreme Court; his name was H. Barclay, and he was as black as a starless night. The bo'sun's pipe shrilled as he came aboard; he raised his brown homburg and said that we were welcome.

We gazed curiously at the hundred or so dockers, policemen and inquisitive idlers standing on the quay, and hoped that the Consul was right. You see, we were white men in a black man's country, and remembering the way the white men had treated black men in the country from which the founders of Liberia had once emigrated, it seemed almost too much of a good thing to expect that the people on the quay should have forgotten.

* * * * *

"Love of freedom brought us here!"—that is the motto of the Liberian Republic.

After the beginning of the twentieth century, when most of the European colonial powers had declared slave traffic illegal, it continued for a while by stealth. The negro became valuable contraband. If you could smuggle a cargo of "black ivory" ashore on Cuba or in the vicinity of Charleston, there was big money to be made. If you were caught red-handed, then such smuggling was regarded as piracy and both ship and cargo were confiscated.

Confiscated rum was poured into the gutter, but what to do with confiscated negroes was a problem. Theoretically they were free persons, but what could a free negro fresh from the Gold Coast do, when all he had learned was to hunt elephants and beat tom-toms? It was not long before those negroes became a real problem.

Hand in hand with this difficulty went another. In America people were becoming strongly opposed to slavery, and there were many, even in the Southern States who freed their slaves. But such freed slaves wandering about among their slaving fellows were not always pleasant people to have about the place. They got ideas which you didn't want put into the heads of your slaves. Gradually, the numbers of both categories grew so large that the matter became a political question.

There were various charitable societies which occupied themselves with these negroes. Some began toying with the idea of sending all free negroes back to Africa, a nice but not very well considered idea.

If you trap a sparrow and loose it again, its fellows will refuse to recognize it. They will in fact peck it to death. The negro whose father or grandfather had come to the plantations of the Southern States from the Congo had seen and experienced things that would make him for ever a stranger in the tribe from which his ancestor had come half a century before.

He would have ideas that might have proved unfortunate in the old milieu. It is not improbable that he would have felt superior to the tribal medicine man in knowledge, and you should never overrule or provoke a medicine man, no matter where you are.

At the turn of the century there were some 700,000 free negroes in America. In 1819 President James Monroe sent a couple of men to the West coast of Africa to examine the possibilities of founding a colony of freed negroes on that part of the coast now known as the "Pepper Coast". The government was prepared to give such an experiment its financial and moral support. The two men returned and that autumn eighty-six free negroes embarked in the vessel *Elizabeth* and under escort of the gunboat *Cyane* sailed for West Africa.

The negroes were set ashore on a little island in an estuary that had been selected as a suitable sally-port for the new colony. Only it was unfortunate that the Kru tribe which lived along that part of the coast absolutely refused to sell the island either to the white emissaries or to the eighty-six negroes. Whilst negotiations were being conducted twenty-nine of the negroes and the two white emissaries died of yellow fever, so the idea was temporarily abandoned, and

Elizabeth and *Cyane* sailed north to Sierra Leone where the English allowed them to land.

The Krus were left to fish in peace until 1821. In that year an American warship with the ferocious name of *Alligator* reached the Pepper Coast. Its commander had definite orders from an impatient President to be very energetic in his dealings with the obstinate natives. Negotiations were begun with *Alligator's* guns trained on the thatched houses of the Kru villages, and the end of it all was that the Krus gave way and parted with a strip of coast some 130 miles long and forty miles deep. The price paid them was some rolls of cotton, a number of umbrellas and some guns, powder and bullets.

The negroes were rowed ashore, the warship sailed home, and the first little pioneer village was built on Montserado Height. It comprised a number of mud huts with straw roofs, and was named Monrovia after the American President, a name it still bears. The country itself was called Liberia.

The colony had to contend with fever and hunger. There was no rush of immigrants. Only the most inveterate idealist would dream of exchanging God's own country for a strip of fever-stricken swamp and jungle near the equator. For those who did go, Liberia had a religious significance, was a sort of promised land. Small contingents came trickling in to Monrovia, where they found that more than two-thirds of the original 114 colonists had died of fever. At the same time there were rumours of stirrings among the native tribes in the interior.

In the years that followed we can see the history of

America's colonization happening over again in miniature form: pilgrims off another *Mayflower* fighting with the original inhabitants of their New World and winning because of the superiority of their modern weapons. The Monrovian negroes had brought two small brass cannon with them and they had need of them. The jungle negroes attacked. The negroes from America entrenched themselves on small islands in the estuary at the foot of Monserado. The cannon were used and technique won the day.

After years of bitter struggle the immigrants managed to gain possession of more and more of the coast they had bought. The moral and economic support they had expected from the other side of the Atlantic was not forthcoming once it appeared that the foundation of a negro state in West Africa had not had the desired effect. It had been hoped that it would prove an exhaust pipe for the large numbers of freed slaves; but, instead of a stream, there was no more than a slight drip, and numerically the emigration was of no significance.

The European colonial powers whose territories adjoined the areas set out in the constitution of 1847 as belonging to the free Republic of Liberia, were much more interested in the new undertaking.

In 1849 the new recruit to the nations was officially recognised by England, Belgium, Denmark and France, but not by U.S.A.! Though Liberia in everything showed its devotion to U.S.A.—its constitution was modelled on that of America, its flag was red and white stripes on a blue field with a single star in the left-hand corner—the attachment was apparently not mutual.

That only came about after the first World War, when it was discovered that rubber trees flourished in the interior of Liberia. At that Uncle Sam's heart began to beat more warmly for the little country of his making. Before then, however, England and France had gobbled up large pieces of Liberia's marches. The civilized element of Liberia sat in Monrovia, little more than a hundred strong, and what went on among the semi-savage tribes in the interior was quite outside the control of the government in Monrovia.

Many of the subjects for whom the constitution had been made can scarcely have had any idea that their country was called Liberia. The chiefs were paramount in their districts as they always had been, and hostilities between villages were quite unaffected by ministerial changes at the coast.

There were, and are, twenty different languages spoken within the frontiers of Liberia—only along the coast is English the main language, an English that still retains the characteristic drawl of the South.

As late as 1907 Monrovia was constrained to sign a treaty ceding about a quarter of the country to France. The method was the now familiar one that was later used with such success in Europe: disturbances among native tribes in a frontier area; French traders are interfered with; as Liberia cannot ensure order, France sees herself compelled to intervene and occupy the disturbed areas with troops; the troops settle and make themselves at home, and then one fine day the country becomes French.

There was not much money with which to govern

in the rickety government palace in Monrovia, from whose windows you could see a dirty, poor town, a symphony in corrugated iron and straw, without any attempt at paved streets. An attempt was made to collect a tax of one dollar per hut per year, but when the tax-collector had to hack his way through the jungle and then present his demand to a tribe consisting of a couple of hundred sulky jungle negroes, he had little chance of getting in large amounts for a government of whose existence the taxpayers had no idea. It was a dangerous job being tax-collector in those days.

In 1910 the entire state budget amounted to some £25,000. There were no railways, no roads, no harbours; just a little coffee, a little palm oil and some piassava for street-besoms. Everything grown in the interior had to be carried to the coast on the heads of natives and paddled out to the occasional steamers that put in there in rickety surf-boats that were always capsizing and losing the cargo.

It was not easy being president of the free negro Republic on the Pepper Coast. England, France and Germany hemmed it in and it was only their mutual distrust and jealousy that prevented those three powers from swallowing up what remained of the negro slaves' dreams of freedom. And Liberia called for help.

Through the intermediary of American bankers Liberia was granted a loan of 1,700,000 dollars—naturally with one or two conditions other than the interest. Amongst other things the lender required the engagement of a financial adviser in Monrovia—a man who could keep an eye on customs dues, taxation

revenue and similar sources of income. And that was good for Liberia.

About 1910 the entire world went motor-car mad, and motor-cars needed rubber tyres. Till then only relatively small quantities of rubber had been required for bicycles, corsets, goloshes and mackintoshes; but after this, rubber had within a few years become a dominating factor in the world's markets and a sort of cold war had broken out between the two main competing producers, England and U.S.A.

And there on the west coast of Africa was a little republic worried to death by its bills, suffering torment whenever a loan fell due, and unable to put into effect any of its plans for improving roads, schools, hygiene, etc. Everything went to pay interest and interest on interest. The president could not afford a new cocked hat; the general's uniforms were moth-eaten and the wife of the minister of finance had to wear the same evening dress year after year.

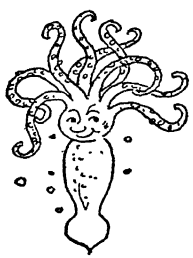
One day an American came ashore in a surf boat. His name was Harry S. Firestone, a name that to-day is not unknown in the automobile industry. He was tired of buying his raw rubber from Malaya and Brazil, tired of foreign powers deciding the price and quantity of rubber he might use in his factory, and he was looking for a peaceable little country where he might grow his own rubber.

Liberia was on the verge of bankruptcy. The war had kept almost all traffic away from the coast, and the exchequer was empty. So it happened that Firestone rented a million acres of the best rubber country in

Liberia and Africa for ninety-nine years. Within three years so much jungle had been cleared that 30,000 acres were planted with rubber. At the same time Liberia received a further loan of 5,000,000 dollars on favourable conditions and the promise of a fixed due on every pound of raw rubber exported from Liberian ports for ninety-nine years.

An American adviser respectfully asked leave to advise the president and his cabinet on certain matters; and while the little republic breathed more easily and people whooped for joy, no one noticed one foreign sound: the faint rustle of silk reins in the rubber-gloved hands of the American adviser.

CHAPTER III.



BRRH . . . rah! Brrh . . . rah! Brrh . . . rah! The sounds came travelling across the waves as monotonous as the cry of gulls behind a plough, rising and falling curiously like the croak of frogs in chorus. I took it first for part of a dream, then I realized that it belonged to the day that was breaking, like the clatter of milk bottles at home. Brrh . . . rah! Brrh . . . rah! Brrh . . . rah!

I stuck my head out of the open port-hole and blinked at the early sunlight. During the night we had anchored off Accra, largest town on the Gold Coast, and along with its neighbour Takoradi, the post of entry and exit for the immense hinterland of the Gold Coast Colony, Ashanti and the Northern Territories.

Along the coast savannah; then comes a huge belt of almost impenetrable rain-forest, then savannah again, and it continues northwards till it ebbs out into the golden wastes of the Sahara. A couple of rivers, a single line railway to Kumasi where goods are collected and distributed between the two major shipping ports of the coast, some primitive roads and scattered villages in clearings here and there, but otherwise few signs of human activity.

Elephants can still pull up young trees and munch the young top shoots without fear of disturbance;

crocodiles can lie in wait in the muddy waters of the Volta river and leopards crouch on the low branches of bao-bab trees without having to fear interference from white man or black. Despite several hundred years of colonization there are few noticeable traces of all the energy and capital that have been expended; beyond a few scratches in the ground here, a few buildings there, what is there? Measured against the jungle and the virgin savannah it looks nothing.

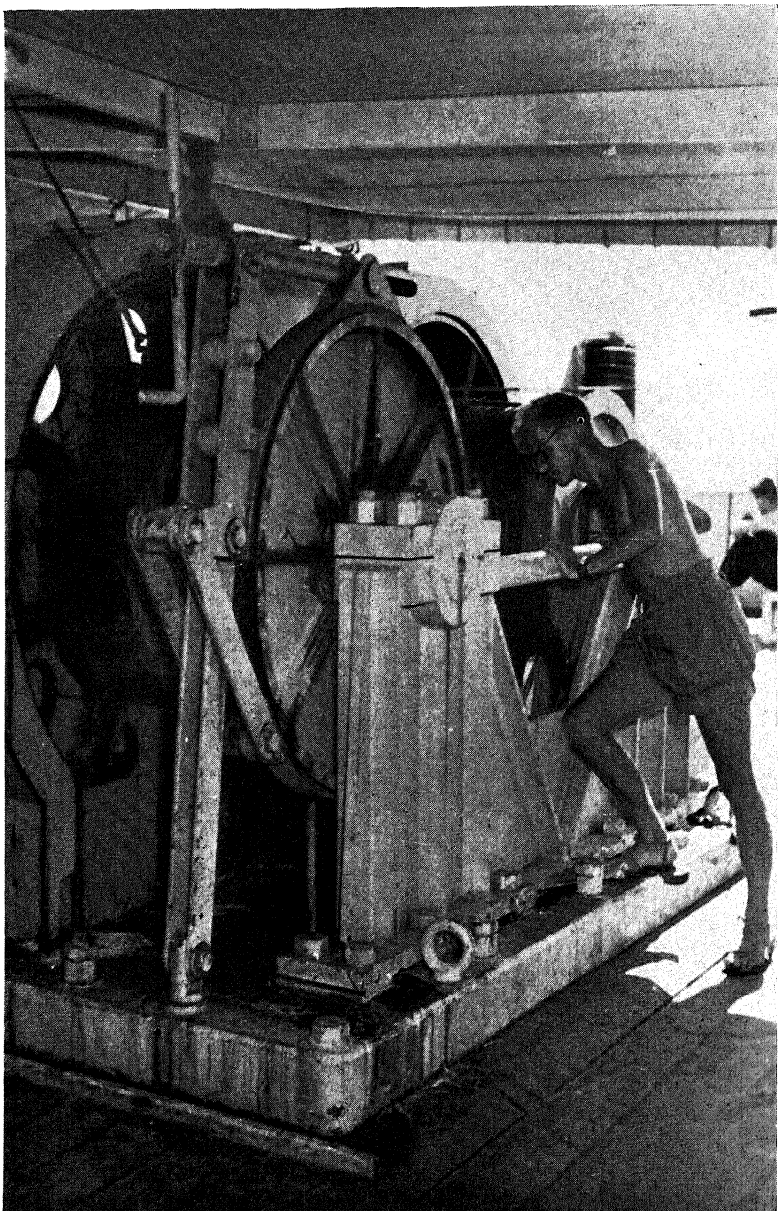
Brrh . . . rah! Brrh . . . rah! Brrh . . . rah! The monotonous hoarse sound was not out of a dream, but growing louder and louder every minute. Then I caught sight of a line of boats working their way out from the shore where the surf was passing its hundred slavering tongues over a stone mole. It was from behind this mole that they were coming one after the other, heavily laden canoes manned by twelve coal-black negroes whose backs glistened with sweat and salt water, and whose arms moved rhythmically to a time beaten by their own hoarse guttural *Brrh . . . rah! Brrh . . . rah! Brrh . . . rah!*

At each "Brrh" they raised their paddles, swung them forward and plunged them into the surf, then pulled with all their strength, raised them again pulled, raised, pulled, raised—Brrh . . . rah! Brrh . . . rah!

Their paddles were of a kind I had never seen before: three-toed like a coot's foot, with the blade painted yellow or red or blue, which is a bit of dandyism on the part of the crew, or a badge if you like, enhanced on ceremonial occasions or when carrying passengers

The Liberia which knew no red tape and had no red carpet

The most characteristic feature of life on the Gold Coast
is the song of the paddlers of the surf boats



The great winch weighing twelve tons which stood in the stern and hauled 12,000 metres of wire out of the depths

instead of sacks, by caps and sweaters of the same colour drawn over their swelling muscles.

On this occasion, though, they were loaded with cacao, and the paddlers sat stark-naked on the gunwale, though a few had tied a bit of leather round their loins for modesty's sake. Rhythmically the paddles cut into the waves, rhythmically the steersman standing in the stern with his long steering oar hammered on a small metal bell. When an extra large wave grew up ahead of them, their war-cry seemed to gather strength, the muscles to stand out even more, and so the canoes crawled forward towards the anchored ship like aquatic insects with twelve protruding legs. They were Accra's famous surf boats. Brrh . . . rah! Brrh . . . rah! So it goes on from sunrise to sunset, as it has done for centuries.

Guinea became Danish in 1656 and in the first few years sent small consignments of ivory, gold and sugar to Denmark in ships that sailed under the African-Guinean Company's flag. To protect Danish interests a number of forts of various sizes were built. Some are ruined; some still stand.

Best preserved is the largest of them, Christiansborg, and it perhaps has had the most chequered career. In 1679 the commander of the fort sold it—just like that—to a well-to-do Portuguese and went off without leaving a forwarding address. In 1683 the Portuguese was made by his own government to give it back, but two years later the English conquered the neighbouring fort, Frederiksborg, and it was never Danish again.

In 1693 a negro chief got hold of Christiansborg by a mixture of cunning and force. The commandant

was the only person to escape and he had to fly in just his night-shirt through a secret passage to the shore. He sought refuge in the nearest Dutch fort while the negroes danced a war dance dressed in Danish uniforms with three-cornered hats and golden epaulettes. They held the fort for a whole year and then the Danes had to *buy* it back, but the negroes held on to the keys and to-day the head of the Aquampo will still proudly show you the famous bunch of keys to the governor's lodgings.

The colony's period of prosperity began in the middle of the nineteenth century. That was the time when Denmark began seriously trading in slaves and the forts on the coast became transformed into slave depots from which negroes from the interior were shipped to the colonies in the West Indies.

The Danes were merely middlemen. The actual catching of the slaves was done elsewhere and by others: Portuguese, Spaniards, Arabs and unscrupulous negro chiefs. The slaves were bought for shawls and mirrors, cotton kerchiefs and old guns. Fathers sold their daughters, chiefs disposed of prisoners taken in a fight with a neighbouring tribe. In the "good years" 10,000 prisoners a year passed through the Gold Coast forts—and the black inhabitants of the coast lived a carefree existence selling food for the huddled slaves awaiting shipment in the cellars of the forts.

When a ship anchored off Accra and the slaves in their chains were rowed out in the canoes, "black ivory" for the sugar plantations of the West Indies, the paddlers intoned the same Brrh . . . rah! Brrh . . . rah! that I had heard.

By 1792 Denmark had progressed so far along the road of humanism that the government was able to issue an order directing that all traffic in slaves from the Danish possessions on the Guinea coast was to cease on 1st January, 1863. That gave those engaged in the trade plenty of time to wind up their businesses. That was the beginning of the end.

The colony tried plantations, but they were destroyed by the neighbouring negro kings who felt slighted because they were denied the profits of their rightful trade in slaves. Then the Danes got into a war with the Ashanti and had disputes with the English about rights of ownership to stretches of the coast. There was nothing but unrest on the Gold Coast and the revenue fell and fell. The colony's budget showed a deficit. In 1849 the Danish government offered the forts to England, and so eager were the Danes to be rid of them, that they accepted £10,000 for the lot. On 6th March, 1850, the Danish flag was hauled down and the Union Jack hoisted over the tower of Christiansborg.

Now the colony is one of England's most promising and lucrative African possessions. The Gold Coast is no longer the white man's grave thanks to modern means of combating fever. Sacks of cacao have taken the place of slaves in the surf-boats and the monotonous exciting song of the black paddlers is no longer a requiem for the hopes and dreams of white men: it is a slogan, a signal, a proclamation of a new age for the Gold Coast.

A large university has been built there; the natives have been given the vote; the colony has set out along the difficult road of self-government.

It is said that the men who paddle the surf-boats of Accra do not last long. Seven years is the maximum. It is their lungs that give out.

Each crew consists of thirteen men. The steersman is the foreman. The members of each crew all come from the same village up country. They come from as far away as Ashanti.

The canoe boys of Accra are famed and notorious. There isn't a cask of rum taken ashore by them of which they do not take toll. When each man has had a decent tot they fill the cask up with salt water. It is impossible to taste it.

The canoes, of course, occasionally capsize in the surf and sometimes a paddler is drowned that way. The boys are said to make it a point of honour always to save their passengers, and apparently no white man or woman has yet been drowned while going in or out in a surf-boat.

But it has several times happened that a motor-car has been lost.

When a steamer is carrying motor-cars for the prosperous ones in Accra or Kumasi, two canoes are lashed together and the packing-case containing the car is laid across them. It happens occasionally that the lashings break. The outermost point of the mole is said to be a car cemetery of no mean size, but with cocoa fetching a shilling a pound in the jungle what does a car or two matter?

No tourist is able to understand the paddlers' songs which are in Ashanti or Fanti, or one or other of the numerous native languages. The more romantic would

no doubt like to think that those are songs which have been handed down through the centuries, that they are the same songs as were sung by the paddlers who took the strings of fettered slaves to the waiting ships all those years ago. They would be wrong. The songs are improvised by the leader and are a detailed description of the passenger being carried.

The song of the paddlers is Accra's signature tune. The play of their muscular arms in sunshine, sweat and salt water is the chain linking the vanished past of the slave coast with the present of the cocoa coast. One thing, however, is certain: in a hundred years the paddlers' song will have fallen silent, and the last canoe will have been smashed in the surf or fallen to pieces on the beach. With competition growing ever sharper it will not in the long run be possible to go on loading and unloading the cargoes of the largest town on the Gold Coast by the medieval methods used at present. Insurance premiums will grow heavier and heavier for goods transported in so picturesque a fashion, and one day the mole will have to be lengthened and the space behind its shelter dredged. The coast of Africa will then be the richer by a harbour and a romantic thread the poorer.

Africa, however, cannot always be a playground for Trader Horns, Tarzans and witch doctors, nor can one much longer preserve the illusion of the Martin Johnson safari film and "Dr. Livingstone, I presume?" Progress in the great continent has long left those days behind. Before very many years are out the elephant and lion will have been relegated to the game reserves

along with the rhino and giraffe, and witch doctors' wives will be demanding wireless sets and refrigerators.

Those Africans who have studied at Oxford, Cambridge and the Sorbonne will not be content to return home to take over their father's straw huts and herds of cattle. They have their own ideas of what Africa expects of them.

England has been sensible enough to prefer to give her colonies self-government instead of embroiling herself in a number of pointless wars whose outcome in the long run would certainly go against her, and in the meanwhile cause a rapid growth of hatred between the races that might end in a frenzied massacre.

Galathea's visit coincided with the holding of the first elections under more or less universal franchise and of the first government. I showed a film about Denmark to the most important members of the white and negro communities in Accra. The auditorium was a garden with fairy lights strung above the paths and cicadas playing in the bushes and trees. There was a full moon that night and an electric storm was displaying on the horizon.

The local chiefs arrived with great ceremony. An open umbrella, emblem of their office, was held above their heads by a chamberlain in a burnous, and they were preceded by an official with a tall staff surmounted with the chief's emblem in pure gold. It was a scene out of a fairy tale.

While the film was being shown I was able to walk round the garden and study the effect on the audience

of this glimpse of a foreign country and culture. Right in the front row were two chiefs fast asleep in their great armchairs. A third was deep in conversation with a court official and in order not to have their attention distracted the two had turned their backs on the screen. Two of the staff-bearers were curled up on the ground slumbering at their masters' feet, the white rims of their spectacles looking ghostly in the moonlight. The other court officials were wandering about as I was, only their interest was in the dregs left in the cocktail glasses from which we had all been drinking before. One or two were finding walking difficult. A very decorative black gentleman in a sky-blue burnous carefully raised his front draperies and performed a necessary act on a little bush from whose other side two white ladies made a hurried retreat. Then the film ended, the proceedings were over, and the chiefs went home, the last with difficulty.

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Slowly we worked our way down towards the Portuguese island of Sao Thomé. Our scientists were busied sorting the samples of silt and the small creatures and tiny crabs, chætopods and sea-slugs, which the sledge trawl was bringing up from 1,500 to 2,166 fathoms.

Various fish let themselves be caught by that great trawl: toad-fish, as black as night, with lanterns on their noses, and cod-like fish with bladders protruding from their mouths, lay entangled in the green mesh alongside star-fish and sea-anemones, but according to Dr. Bruun there was not one unknown species, nothing to make a fuss about.

All round the ship whales spouted and dolphins leaped. Now and again a devil ray the size of a dancing-floor leaped above the surface and fell back again with a roar like a cannon firing. However, our interest was not in such creatures as they, but in the great winch when it slowly came to a halt as the trawl reached the surface after its long journey up from 2,000-2,666 fathoms. No one could foresee what might have happened to the trawl in the dark three miles and more beneath us, nor what it might contain. I don't think any of us, whether scientist or not, got over that tingle of excitement we all felt as the winch stopped and everybody stood each at his post ready to haul the gear aboard.

We sailed and we worked. The days passed and the winch wound its great wire out and in, out and in, day and night. We zig-zagged southwards from the low lands of Africa's continental plinth, across the depths of the Bight of Guinea, until one evening we saw the glint of the lighthouse on the lonely island of Sao Thomé. When we awoke the next morning *Galathea* lay at anchor with her bows in the southern hemisphere and the after-deck in the northern, and up on the boat deck Jacob, our long-tailed monkey, was amusing himself jumping to and fro across the Equator.

The voyage continued. Only once in the following days did we see land, and that was when we came right into the corner under Africa's overhang, the hottest place anywhere on the coast, the bay by Victoria in Cameroon, where primitive canoes, mere hollowed-out trunks, came circling round. Victoria lies a little off the beaten track as was obvious from the goods the natives

wanted in exchange for their pineapples, bananas and other tropical fruits.

In our previous ports of call cigarettes had been the currency, but here there was no demand for *Camel* or *Lucky Strike*. All requests were for dry bread or old shirts, symbolic of the backward state of the country behind the narrow fringe of sand of this former German colony. England and France each took part of it over as a mandate under the League of Nations of blessed memory, but as they are only administering the country for an indefinite number of years, they cannot be expected to take the same interest in it as in their own territories.

Who is to enjoy the fruits of expensive improvements? In British Cameroon it looks as though the natives themselves will. The colony's economy is based on a co-operative system. The income from the export of palm oil and banana is administered by a trading company controlled by the government and the surplus goes to benefit the mandate.

The people on the coast are Bantus, in the interior Sudan negroes, one million in all, and that surplus is continually rising. So far the mandate is not quite self-supporting but requires occasional loans from the Treasury; but this is a new and unusual experiment and it requires a little time yet.

When the British came to Cameroon, they restored the fallen buildings and palm-oil factories and set up the Cameroon Development Corporation, with a board of nine members—three of them representatives of the natives—which set about developing the cultivation of

the two crops for which the land there is most suited, bananas and oil palms, and now every five days a refrigerator boat takes a cargo of large bananas direct from Cameroon to London.

Hospitals have been built, workers' dwellings erected around the factories and new machinery imported by degrees as the country's economy permitted. The day is not far distant when the Cameroon Protectorate will be able to repay its loan.

Change there is both here and in the people's attitude, even though they still find it difficult to understand the white man's conception of work and standard of living. On the forest paths in the lovely country round Victoria you will meet long lines of women carrying their goods to the town. Those of the older generation stop, curtsey and say: "Good afternoon, *Massa*!" but the younger ones just give a nonchalant nod and say: "Good afternoon, *Sir*!"

Victoria is just a long, dusty street with two shops, a post office, a government building and a mission book shop, but steamers come and go in the harbour as regularly as clockwork.

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One morning the water round the ship had changed colour. It happened quite suddenly and there wasn't a sign of land anywhere on the horizon. We were a hundred miles from the nearest coast yet the sea had suddenly turned from its usual deep blue colour to a yellowy-brown café-au-lait. On the surface were long streaks of golden foam like on a well-poured glass of Guinness, and branches and tufts of grass slowly drifted

past. It was not so much the sea as the river Congo welling out from the interior of Africa after a journey through more than half of that great Continent's dark forests and sun-baked bush.

The Congo is of oceanographic interest, and we at once began taking a series of silt-samples and hydrographic tests and measurements of light along a line at right angles across the deep canyon that the river has cut in the ocean bed even miles out at sea.

There was ten fathoms of water beneath our keel when we began the series on the north side: 455 fathoms in the centre of the canyon, and eight fathoms when we reached the top of the southern slope, but that was the next day. Just before sunset on that second day we passed the southern rim of the mass of water that flows out through the seven-mile mouth of that great river. The line was as distinct as a cut made with a knife: café-au-lait to the north and a poisonous green to the south; at the point where the two waters met in choppy eddies the surface was whipped by great shoals of fish, leaping and diving and shooting across the surface; small fish being pursued from below by greedy bonitoes, golden mackerel, tunny and sharks, and from the air by dense flocks of sea birds continually diving and coming up with fish-tails flapping in the corners of their beaks.

The days passed and when we had been three weeks at sea some of us began to long for shore leave. It was, too, time that we put in somewhere, for we had long since come to the end of our supply of drinking water and were drinking a tasteless fluid which the engineers

distilled from the sea. The ship lay high in the water with a definite list to starboard because our oil tanks were nearly dry.

The evening before we put into Luanda in Portuguese Angola, we hove to for a few hours and fished. We rigged up a contraption of steel tubing astern with a platform on a level with the water, and on this stood a man with a butterfly net tied to a bamboo rod. A powerful searchlight was fixed near the surface of the water and the performance began. Confused by the strong light the flying fish circled round with outspread wings but they would never make up their minds to take off. Transparent jellyfish came floating up, the yellowy-red core in the centre looking like the yolk of a raw egg. Thousands of small fry gathered in dense shoals beneath the fisherman's feet, and out from the dark depths came greedy octopuses, their tentacles extended and pointed sharp-edged parrot's beak ready for action. They were all caught in the fine meshes of the net, and hoisted over the rail where jars of formalin awaited them. The hunting cuttlefish changed colour from deep red with spangles to yellowish-white and ashen-grey as they gradually realized that they had been taken captive. We put them in the aquarium where, to avoid being photographed, they spewed out clouds of browny-black and hid in their home-made darkness. Then, when the needs of science had been satisfied, the man on the platform fished for the galley and our refrigerators. May I recommend cuttlefish mayonnaise?

The west coast of Africa is flat and dreary. Apart from the inner corner of the Bight of Guinea where

jungle-clad hills come right down to the shore with impressive Mount Cameroon in their middle, West Africa is flat and uniform, sandy and dry. Dunes, swamps, flat savannah, mangroves—seen from a distance it is all ineffably dreary. It is only when you look closer that you will see that it has something to be said for it.

The entrance to Luanda was certainly not exotic. A few steep slopes with a lighthouse on top and a fringe of boulders along the shore. We swung round the point of the low island that acts as breakwater for the bay, and there was Angola. This Portuguese colony is almost square: eight hundred miles in one direction, eight hundred in the other. That gives it an area greater than France, Italy, Spain and Portugal together. Yet in Angola only four million people live. Of these forty thousand are white, the rest Bantus, Bushmen and Mulattoes. People who know say that if all its possibilities were as rationally exploited as in Europe, Angola alone would be able to take a further fifty million. At the moment there is no question of that. There is a little agriculture, some stock grazing and certain amounts of sugar, coffee, cotton and rubber are grown, while small quantities of palm oil, gold, diamonds and ivory figure among the exports.

Not the whole of Angola is as flat and uniform as the coastal plain leads one to think. The plain is just a broad foreground to a billowy plateau covered with rank rain forest that in the north merges into the jungle of the Congo. Other parts of the country are flat plateau with a pleasant temperature suitable for

Europeans. But so far there are only four inhabitants to the square mile and they are black Ovimbundus who love to deck themselves with dangling copper rings and anklets, but who are otherwise quite devoid of what we understand by civilization. They have no written language, no art, and they live in constant fear of the evil spirits of nature and in primitive terror of the witchcraft of the medicine man. The white population is, however, continually growing.

The Portuguese go to their colonies and stay there. You can see that by the buildings, which are homes intended for more than one generation, and you can hear it in the intonation, for the language acquires a stamp of its own, adopts its own words and a native phrase here and there. There is plenty of local patriotism, and the towns are prettier and neater than in the colonies where money-making is the colonist's only concern. So, too, the relation of the whites with the natives would seem to be better. The Portuguese, who are themselves a product of the different races which, in the course of centuries, have stormed the Iberian peninsula, make no sharp distinction between white, brown and black. That is why, in Angola, there is not the same atmosphere of tension as in those colonies where each race surrounds itself with barbed wire.

I should say, too, that the natives smile more. They may be more exploited than elsewhere, for they look poorer, more ragged, I do not know about that; but certainly they are not afraid of the white man, not cringing or scowling. Perhaps kind treatment means more to them than an extra shilling or two a day.

Perhaps they prefer going without shoes and not having a vase of paper flowers in the shack where they live, if that means that they may feel themselves as human beings. Who knows? I was not long enough in Luanda to pass judgment on a question which is the nightmare of all colonial countries. The future will show whether England is right in giving the natives a free rein and considerable self-government as has happened on the Gold Coast, or whether the Portuguese method creates healthier conditions. A generation should be enough to decide, but will the coming generation be allowed to carry the experiments through?

The railway trucks at the goods yard in Benguela seemed to imply that they wouldn't. Day and night they rattled over the rails loaded with what at first sight appeared to be peaceable granite sets. On closer inspection the granite proved to be uranium ore from the Belgian Congo on its way to atom bomb factories of unknown address.

The Benguela railway penetrates nine hundred miles through Angola and on deep into the Congo. At the moment it is bringing prosperity to the colony, but the great rise in its receipts seems to be due mostly to the transport of that innocent-looking uranium ore.

Angola itself has had almost five hundred years of peace. It has suffered none of the tribal wars or attacks by other powers that have delayed development in most African colonies.

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The period following our visit to Luanda was one of hard work. We now know not only that there *is* a

bottom to the south-eastern Atlantic off the coast of south-west Africa, but we also know exactly what it looks like and how many chætopods and other lower animals it contains to the square yard, and how it smells. During this period we did not catch one creature more than two inches long, but we caught very many of them. Glass after glass was filled with samples of silt for later geological and chemical examination. Each sample obtained from the bottom at those great depths took about six hours from the time the Petersen grab was lowered until it was pulled up again with its jaws closed round the slime off the sea-bottom.

The way we worked was to sail out to where the depth was some 2,500 fathoms, and then come back in a straight line taking successive samples at various depths, the last in full view of those on the shore, from a depth of only eight or ten fathoms. Such a succession of samples from deep to shallow water we called a "section". Before Luanda we had taken forty-three silt samples and on the way from Luanda to Cape Town the grab went down fifty-eight times to depths that varied from ten fathoms to 2,000 fathoms.

For most of us it was not particularly exciting work, but it had three purposes. In the first place it enabled the scientists to draw a picture of the production of living organisms in the area. Then it was possible to learn something about animal geographic conditions, that is the distribution of species about the different parts of the globe; and in the third place those silt samples yielded a number of species which would not have been caught with our various trawls which acted

on or immediately above the sea floor, but caught up nothing that lived in the various layers of the ocean bed itself.

A sample of silt provides an insight into the production of foodstuffs for edible fish taking place in the water concerned. Our European waters have long since been mapped by means of such samples. The number of small creatures found per square yard varies fantastically. There are desert stretches in the sea where the weight of such creatures amounts to no more than a few milligrams, and there are rich pastures, as, for example, in the shallow water off South Jutland where their weight per square yard amounts to some three pounds. Naturally we were not able to undertake extensive examinations of this kind, but the sections that *Galathea* took with her silt sampler here and there about the world will have helped to start a pioneer work that future generations will have to continue. On occasion these served to solve a purely local problem, as was the case when we put in to Walvis Bay to spend Christmas there on our way from Luanda to Cape Town.

Walvis Bay is one of the richest fishing grounds of South Africa. The fishing boats put out from a coast that is desolate desert sand, yet in the season proper they can return home in a few hours laden deep with sardines. There are fish-canneries and fish-meal mills on the shore and they earn a lot of money. That fact is the one and only reason that could prompt anyone to live at Walvis Bay. The desert comes right down to the sea. The sand blows and settles in drifts before the doors of the houses, and continually blocks the road to

the nearest civilized town, Swakopmund, some thirty miles to the north.

In the early days of South Africa the Dutch governor threatened his subjects with punishment were they to waste their time fishing. There were so many other tasks crying to be done. To-day, however, there are 3,000 persons engaged in fishing on the west coast of South Africa. And though there are millions of sea birds to aid their efforts it seems to make no difference to the numbers of fish in the richest grounds in the world. The coast which only a few decades since was rightly hated and feared by seamen and whalers, and which they called the "skeleton coast", is now rapidly changing its appearance. The desolate desert is being forced back by busy fishing villages and their canneries.

Never have I seen such fantastic phosphorescence in the sea as that Christmas Eve in Walvis Bay. Our scientists clustered in the stern and looked at it, but from an entirely different point of view. To the professor phosphorescence is not romantic, it is an accumulation of luminous pelagic organisms of various sizes belonging to both the animal and vegetable kingdom, and in Walvis Bay that almost incredible presence of phosphorescence was of special interest, for, as long as man has fished in south-west Africa, the unexplained periodic dying of fish in Walvis Bay has been an embarrassing problem. *Galathea* had arrived just at one of these periods when death had come to the Bay.

That afternoon when we had been ashore we had seen millions of fish which had been washed up lying on the beach with their bellies upwards in layers inches

thick, and poisoning the air with their stench. There were sheat-fish and sardines, a solitary shark, and a distended sea-lion, a dying penguin and several dead cormorants, all stricken by the mysterious poison that at intervals harries the bay and all that lives there.

As soon as midnight was sounded and the official festivities came to an end, the bo'sun's pipe rang out and *Galathea* sailed out into the Bay and the moonlight to fetch samples from the bottom, to measure and record, in an attempt to solve the mystery of the plague that comes to Walvis Bay.

It had been suggested that the regularly recurring death of masses of fish in Walvis Bay was caused by subterranean rivers which debouch in the Bay and bring poisons with them. There was another theory that submarine volcanic springs at intervals spewed sulphurous vapour from the sea floor with catastrophic effect on the dense shoals of fish. Other theories have attributed the disaster to lack of oxygen in the water at certain periods, and to pollution due to the disengagement of poisonous substances by micro-organisms in the sea. *Galathea,* with her modern equipment, was able to eliminate several of these theories; there was only the one really probable answer: that at certain times of the year, expecially when the sun stands highest in the heavens, that is, at Christmas time, so many small micro-organisms of a certain kind are produced in the sea that the poison they secrete is present in such quantities as to be able to kill the thousands of tons of fish that every year are washed ashore there during December and January. These organisms belong to the algae.

There was no question of there being any lack of oxygen, since all of the samples *Galathea* took from various depths showed that there were numerous creatures living even in places which had hitherto been regarded as a dead zone where life could not flourish. There were both bivalves and annelida of different kinds, and all in the best of health. The smell of sulphurated hydrogen which spread each time a sample of silt was brought up was due to the formation of sulphurated hydrogen down in the mud and could not be made responsible for killing the fish. There thus remained the theory of microscopic fure-algae producing poison.

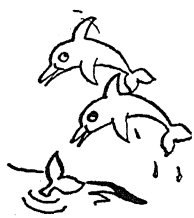
Having more or less solved the problem *Galathea* sailed on southwards down the most melancholy and desolate coast in the whole world. By some whim of nature this Skeleton Coast is so rich in diamonds that the government of South Africa has had to close large tracts along the coast and the river banks, for the simple reason that the rough diamonds lie there loose in the sand in such great quantities that to open the territory would bring ruin to the diamond industry, and cause a complete revaluation of everybody's jewel box.

Scientists are not practical men. If it had been *my* expedition I would have concentrated all the silt-sampling we were to have done during those two years just in this spot—outside the closed area, but in very shallow water, and I would have been very careful in examining all the sand and mud.

There was lots of life in the sea and in the air. Penguins splashed around so low in the water that only

their heads and necks were visible above the surface. Sea-lions turned somersaults in front of our bows, and flocks of gulls and cormorants passed over head on their way from the guano islands along the coast to their fishing grounds.

On the day after Boxing Day we reached Cape Town.



CHAPTER IV.

Scientific investigation of the sea is taking place all over the globe and more or less all the time. Large and small expeditions are continually setting out, some with just the one objective, others have set themselves several tasks. Some keep to one definite district, others roam about. But their activities are all part of a carefully laid plan, and each serves a definite purpose. As a rule, the public hears little of their work. This normally comprises a systematic series of investigations that to the outsider are far from exciting. It is work that continues from one generation to the other, and which each scientist hands over to his successor.

The silt-samplers go down to fetch apparently uninteresting plugs of mud and sand from various depths. Cunning instruments bring up samples of water and measure temperatures. Others measure the intensity of light in the different layers of water. In the laboratory afterwards the living conditions of fish at the place being investigated are examined in the light of these data and of the amount of salt, oxygen and microscopic foodstuffs present in the water. In the course of time all these investigations will allow the scientist to give us as accurate a picture of the sea as the atlas gives us of the land.

Part of the routine work of all ships on these expeditions is that of hauling trawls behind them, either over the sea floor or through the free layers of water; small triangular oyster-scrapers, various kinds of net, and specially constructed ones that close at a given depth, and of course, all the gear of the commercial fisherman, his nets, trawls and lines.

The deeper you fish the fewer fish you catch, but the more interesting they are. *Galathea* was the first expedition in which fishing at depths of 13,000 feet and more was part of the daily routine. We had already filled hundreds of jars with strange creatures, many of which had only been caught once or twice before. There were several which we suspected of being quite new species; but that is a claim you have to be more than careful in making, and there was no knowing for certain whether or not they really were new, until we had got them home. The larger a creature is, the greater the chance of its being known. The smaller creatures are more likely to have escaped the notice of fishermen and scientists through the centuries. It is the same thing when people insist that the jungles of the Amazon do not contain a single unknown mammal, although it is known that the floor of the virgin forests there harbour various kinds of insects that have not yet been named.

Things do happen, however, to spite theory and reverse one's ideas. A case in point was the discovery of the *okapi* in the African jungle around the turn of the century, and another, even more sensational, that when *Latimeria* got into a fisherman's net south of East London in South Africa in 1938. It was rather

carelessly handled by the fisherman, but the appearance of that sky-blue fish between four and five feet long was so unusual that they took it ashore. When the zoologists who were summoned saw the remains of that fish, they gaped. You can say that they were familiar with it—from fossils. It was a very primitive creature, a tassel-finned fish, which by rights ought to have died out some eighty million years ago. Instead of that, there was one that had swum into an ordinary trawl in thirty-three fathoms of water.

Naturally, we in *Galathea* were hoping that we should be lucky enough to catch one of those. Dr. Bruun had his own theory of its true haunt and of the depth at which it was most likely to be encountered. It was obvious that it could not normally occur in such relatively shallow water, as otherwise it could hardly have escaped being caught for so long. Dr. Bruun had come to the conclusion that we should expect to find it at about 833 fathoms, and so it was decided that we should depart a little from our plan of not fishing above 2160 fathoms where there was a chance of encountering it.

When we rounded Cape Agulhas and steered eastwards, it was into a new world. We were heading for the Roaring Forties, the once famed and feared highway of the big sailing ships, where the west winds storm almost the whole year round. We rounded Danger Point and some large white albatrosses circled round the ship and so remained with us all the way along the south-east coast of Africa. Everywhere were jabbering penguins, diving seagulls and the water itself was alive

with fish. It looked as though great patches of it were boiling. We sailed on.

At a depth of 2,666 fathoms we sent down the silt-sampler and the sledge-trawl, the result was negative. The sampler had not closed and the trawl had not fished. That happened fairly regularly, though not so frequently as to be depressing. Each time we sent our instruments down to those great depths, it was a sort of blind shot. Our precious echo-sounder drew us a fairly reliable profile of the bottom, but it could not tell us whether the bottom three miles down were soft mud, hard sand or scattered with stones. It could not reveal the presence of wreckage or water-logged brandy kegs or trunks, and even small hindrances could mean a torn net, a bent bar and trawl out of action. We had certain means of registering a sudden jerk on the steel wire hauling the net, but, when you had to have five miles of wire out in order to fish three miles down, no means of registration was as effective as one could have wished.

If, at the end of the eight or ten hours it took to lower a trawl, fish, and haul the trawl up again, there was nothing in the net, it was not all disappointment. A negative result was also a positive one, in that, if the equipment had functioned, it meant that animal life at that depth at that point was minimal, and as a rule, such occurrences strengthened the theory that little life on the surface also means as good as no life in the depths.

The creatures at the great depths live off the organic life which slowly filters down from the upper layers of water, and escapes being eaten on the way by the

inhabitants of those upper storeys. And the more sparklingly blue the sea is, the less likelihood is there of life being present. The blue sea so beloved of poets, romantics, and colour-photographers is, in actual fact, the barren part of the ocean. The more turbid and greeny-brown in colour the water is, the more plankton lives in it, the more nourishment there is for the small shrimp-like creatures that are eaten by the little fish which in their turn are devoured by the big fish. Turbid water keeps the economic flow going, in clear water it comes to a halt.

South of Africa the water was sparkling blue, a magnificent background for white sea birds, and a lovely mirror for the sinking sun, but biologically of very little interest. Here we sent the trawl down to the greatest depth so far, 3,000 fathoms. But the result was meagre. The trawl had worked beautifully. It had been drawn along the bottom for three hours, but it only brought up some sea-anemones and some bryozoa. We persevered. Trawl after trawl was made, slightly monotonous, routine work. Some were failures, with the equipment not working as it should, others were successful. The days passed with the winch whirring and the steel wire being wound out and in, out and in. *Galathea* worked methodically, followed day and night by inquisitive albatrosses. But then a storm came, and we packed up and set course for Durban to bunker.

Galathea's route round the world had been the cause of endless headaches ever since we had drawn the first hesitant line across the map ten years before. There were endless things which had to be considered: rainy

seasons and dry seasons, cyclone seasons, and times when fog persists. The sort of work we wished to do called for water as calm and placid as possible. If we could have concentrated our work round the Equator it would all have been much easier, for north and south of that line are the Doldrums, a sort of no-man's-land between belts of the trades, the horror of the old sailing-ships, where the wind is indolent and only comes in feeble gusts of short duration, now from this quarter, now from that. But we had had to go far to the south round the Cape of Good Hope, then we would have to go south of Australia, then far up into the north to reach the greatest depths of ocean in the waters east of the Philippines. The difficult thing was planning it all so that we got the best possible conditions at each place where we worked. Originally it had been intended to go westward round the globe, but a delay of some months in setting out had knocked that plan on the head, and we had gone eastward instead.

Before we had even lost sight of the coastline at Durban on our way out through the Mozambique channel the weather bulletin announced that a tropical cyclone was developing along the north-west coast of Madagascar. It was moving south-west with a speed at that time of six to eight knots.

Cyclones are a science in themselves. To all appearances they follow definite courses and grow and diminish in accordance with a definite scale. But there is no knowing when the devil will not suddenly enter into them, and then they will break their steady course and swing to the side at a sharp angle, or they can divide into

two fully competent cyclones which each make off in its own direction dealing death and destruction in areas where people had already been heaving sighs of relief because all danger was past. Six to eight knots was nothing. *Galathea* could have run from that as easily as anything, but the speed of a cyclone can grow from hour to hour, and when it passes twelve knots it ceases to be amusing. However we put out our trawls and hoped that our good relations with the clerk of the weather would persist.

In the following days, while we zigzagged northwards up the Mozambique channel, Lorenzo Marques reported three cyclones of various strengths. We followed them in the weather reports from hour to hour. Sometimes it looked as though they were going to come dangerously near us, but then they changed their minds in time and turned aside or petered out under Madagascar. None of them crossed the straits to go ashore on Africa as they had done the previous week when a Portuguese steamer, four times the size of *Galathea*, had been driven on land south of Mozambique and knocked to pieces.

It was here that our trawls brought up an unexpectedly rich booty. There were so many deep-sea lobsters that for once everybody on board was able to enjoy the results of our fishing. It had been a constant source of disappointment to our gourmets that the scientists had so meanly insisted on popping the choicest shellfish and other delicacies into the deep-freeze room or the formalin jar. But now we all had lobster. And we went on fishing. The next trawl produced twenty-five great witch lobsters, strange sea-spiders with

incredibly long legs sticking out from a round body. The Latin name was *Munida Incerta,* and previously only three specimens of the species had been caught. That same day three trawls produced well over 4,000 creatures among which were fifty-five different species of fish, including six deep-sea fish of a species of which that number had not previously been caught. There was another small deep-sea fish, *Peristedion weberi,* of which previously only one specimen had been known. We fished up ten of them in one day. That shows how virgin and untouched were the depths *Galathea* had chosen to explore.

Slowly we zigzagged northwards and all the time it was so hot that the sweat ran off our bodies both day and night. Having left one spot we moved on until the echo-sounder on the bridge revealed a stretch of bottom suitable for trawling. Then the engines were stopped, samples fetched from the bottom and analysed, light measurements taken at different depths, samples of water fetched, temperatures measured and salinity determined. The production of organic stuffs was examined with the help of radio-active carbon and a geiger-counter. Then the fishing equipment would be put out, a bottom-scraper, a sledge-trawl, a shrimp-trawl and a purse-net or a long line with hundreds of hooks. All the results were recorded and entered. Tiny items in a mosaic that in twenty, fifty or a hundred years' time will provide a picture of life at the great depths and give the world an indication of where to look for replacements for the sources of facts that by that time will have become exhausted. There is no doubt that one day whales will have become extinct. Let us hope that by

that time the oceanographer will be able to point to hitherto unexplored fields where food can be fetched for the catastrophically growing population of the world.

We put into Beira in northern Mozambique and then off again back to the sea and the stifling heat, and the heavy soporific cyclone air that kept us anxious. However, we were on our way northwards towards the Equator again, and so out of the area of the cyclones. We noticed their proximity in the form of driving rain, not rain of the kind that refreshes you, but luke-warm showers that just fill the air with moisture. What clothes you may have on your body stick to the skin. Breathing seems to become more difficult, your bedclothes are damp, leather becomes mouldy, and metal rusts, wrist-watches stop. It is almost impossible to force yourself to do anything. Then, fourteen days after leaving Durban, we again saw the contours of land on the horizon. A few small coral islands and a haze of mountains behind them. It was the northern point of Madagascar.

It had been originally planned to visit Tamatavi, roughly half way up the eastern side of the island, where it is easy to get up to the plateau in the interior. But this was no longer possible as rising oil prices were forcing us to save. The expedition's budget, which had been stretched tight enough before we started, would stretch no more. So all we did was to touch at the naval base in the north of the island, fill our tanks and off again, across to Mombasa.

On the way between Madagascar and Mombasa we had the Petersen silt-sampler down at 2,500 and 2,765

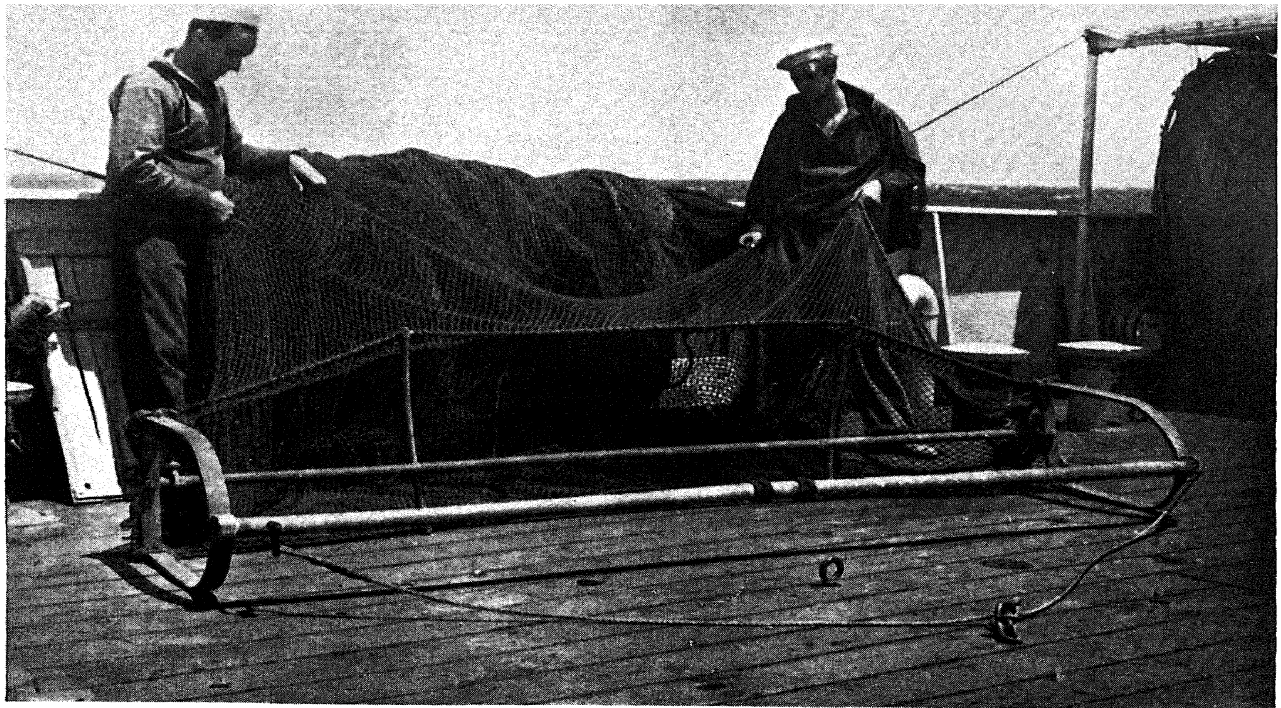
fathoms and the samples had shown that animal life on the bottom at such depths was practically nil. In the mud there was only one annelid and four small shrimps. But the trawls had yielded well, and several of the fish they brought up had had to be entered in our journals as unidentified. There were seven deep-sea toad fish taken in one trawl, and seventeen large luminous sea-feathers which were still shining brightly after they had been pulled up on deck. From what we brought up you could see how the fishes' eyes grew smaller and smaller the greater the depth from which they were fetched. Several of those from the greatest depths were blind.

As we approached Mombasa a dhow came gliding with slack sails heading for the same entrance through the reef. The Arab dhow has certain points of resemblance with the caravels of Columbus' time. It is a ship of the Middle Ages and has been sailed unaltered ever since. It has masts slanting forward and huge sails, a high stern which is richly carved. In December they come with the north-east monsoon down from the Persian Gulf and Arabia, and they only go back when the monsoon changes and starts to blow steadily from the south-west. Their planks are sewn together with coconut rope because on the great seas there are devilish magnetic forces which pull all the nails out of ordinary ships' sides, or so at least it was believed in Arabian sea-faring circles around 50 B.C., and that form of construction has been used ever since. Because they owe their lives to the tough fibre of the cocus palm, it is even to-day impossible to get a dhow to accept a load of coconuts.

They sail from their native coasts with a crew of fifteen, and always there are three or more of them together. To keep contact between them in the intense dark of the tropical night, the watch beats a tom-tom at intervals throughout the night. They come from India, Persia and Arabia. They bring salt from Aden, dried fish and red bricks and stone for building houses in Mombasa. On top of the cargo many of them lay Persian carpets, beautiful things made in the villages of the interior; yet, while these picturesque Arab skippers who go ashore in a chalk-white burnous with a silver chased dagger in their belt, scornfully reject the idea of installing an auxiliary motor, not a few have yielded to the temptation to replace these handwoven shiras and kirmans with less valuable carpets imported from Manchester. The unsuspecting tourist pays the same wherever the carpet comes from, and everybody is happy. Surely a rug bought straight out of a ship from the Arabian Nights could not be other than genuine?

On their way back across the Indian Ocean at the beginning of February the dhows carry cargoes of maize, timber, and piece goods. Despite the competition of fast cargo steamers the dhow traffic at Mombasa is still very considerable.

Galathea was to spend a full week in Mombasa having her bottom scraped in dry dock, and we took the opportunity to go ashore. The Danish Consul and his wife offered to drive me up to Nairobi, along Kenya's main highway. It was a distance of nearly five hundred miles, and from my knowledge of that kind of road I was prepared for twelve to fourteen hours jolting over a



The sledge-trawl which had a mouth three metres wide; a sturdy instrument that did us good service

Fish with pointed noses and giant crabs were some of the surprises the sea provided from depths where professionals never fished

bumpy earthen road that would be broad and magnificent when seen from a distance, but on closer acquaintance prove to be furrowed with runlets, pitted by the wheels of heavy lorries during the rains, and have all its bumps and ridges hardened into cement by the sun of the dry season.

We left Mombasa early in the morning and reached Voi, half-way to Nairobi, about lunch time. So far the drive had corresponded more or less to what I had expected. Only the native villages seemed happily to have escaped most of the normal effects of civilization. At least there were none of the usual glaring signs of it—roofs of corrugated iron, walls made of rusty petrol tins hammered flat, people wearing a grotesque mixture of native garments and European rags, and either scowling or fawning on you for a cigarette. The villages along the road had been refreshingly primitive, the huts genuine native huts, and the little black girls so handsome in their grass skirts that waggled rhythmically, like the tail feathers of an ostrich, as they gracefully stepped aside to make way for the car, the sun caressing their naked torsos and gleaming on their shining necklets and anklets.

Slender coconut palms drew a pattern of light and shade over the pointed roofs of the straw huts, and small black piglets grunted happily in the red dust among naked babies and decrepit old people in the open space in the middle of the village. Who cared for our civilization? Not Africa, you would have thought.

Later that afternoon Olle Beyer, the Consul, suddenly braked. From open plain we had come into

a country of low bush and ahead of us on the road lay some large hummocks in the middle of the carriageway.

"Road up?" I asked, feeling a little indignant that no warning notice had been put up. "Suppose we'd come along at night; we might have driven straight into it."

"Elephant droppings," said Olle.

We got out and walked across to the great heaps. Elephant droppings they were. It was a strange feeling getting out of that gleaming American car, with its wireless and other gadgets, on to a highroad where every sharp curve and level crossing was carefully marked, and then seeing the very obvious traces of an animal which one was accustomed to regard as belonging exclusively to zoos and children's picture books. I couldn't understand why all the sparrows in the world hadn't emigrated to Kenya. We drove on. A mile further on three trees had been flung across the road. The breaks in the trunks were still fresh.

"Those look very fresh," said Olle, "It can't be long since they passed."

Olle is no white hunter. He is not one of nature's joyous children who love to wake up in God's open air and who can tell you straight away whether it was a lion or a tiger that made the tracks on the river's bank where you want to wash. He would find it impossible to tell whether a bent blade of grass meant that a gnu had fled to the right or the left, and however much he sniffed at a trampled bed in the grass he could not for the life of him have told you whether it had been used by an okapi or an Irish setter. Olle is an office worker, and very clever in the travel business. But when

elephant droppings are still steaming, and when the leaves of broken trees are still fresh despite a broiling sun, you don't need to be a Trader Horn to draw a conclusion.

"We must see if we can find them," said Olle, and Kirsten, his wife, clapped her hands excitedly.

Of course we had to go and see them! They would be sure to be delighted to see us! I tried to think of all that I had ever learnt about the African elephant, and as we turned down a side road I felt certain that somewhere I had read that in contrast to the Indian elephant, which is meek and mild and has small ears, the African has big ears and is blood-thirsty and vindictive.

"Stop," whispered Kirsten.

In a small grove of trees was an elderly male elephant. He was walking along tearing off the tops of trees to right and left. He did so slowly and methodically without so much as a glance at the car and apparently unconcerned by having a public. *Crash!* There went the top of a palm. *Critch!* The top disappeared off a pandanus bush. It was like a youth with a daisy doing "she loves me, she loves me not". The old bull, however, did not look as though he were at the age of calf love, but rather as if he had been driven out of the herd by a younger and more brutal rival with longer tusks. Now the old one was going about by itself and by no means elephant-grey as it ought to have been, but red-brown all over with dust from the dry savannah. Unhurriedly it disappeared in among the trees moving away from the road.

"Ooof!" said Kirsten, and mopped her brow. It was the first time she had seen an elephant in Kenya.

We drove on down the side road. The sun was very low and the air quivering redly. Vultures were circling down towards the trees they had selected as their perches for the night.

"There!" we all exclaimed simultaneously. Twenty yards from the road ran a little stream, and on the other side of this grew a giant bao-bab tree, and under the tree stood the largest elephant a big game hunter could possibly imagine—an old cow. At her side was a baby elephant, a year old it might have been, judging by the young ones I have seen in zoos. They were drinking, standing facing us. They dipped in their trunks, sucked the water up, bent their trunks inwards and upwards and sprayed the water into their mouths. I had always thought that they drank through their noses, but evidently not. They stood there for five minutes, then they became playful, and bending their trunks outwards and upwards, sprayed themselves so that the red dust ran down their flanks, leaving dark grey strips behind it. That seemed to amuse them. Now and again the mother stopped playing for a moment and looked straight at us. We could see her little piggy eyes staring at the windows of the car, which may have perhaps been gleaming in the rays of the setting sun. She gave her head a shake and seemed to be considering the matter, but then decided to forget us. For a whole quarter of an hour we sat enchanted, watching their play.

Having got over our initial surprise we began talking and our voices grew louder and louder. I don't know

whether in the end she heard them, but suddenly the mother elephant stopped playing and began to waggle her huge ears backwards and forwards and bent her trunk menacingly upwards. Any child will tell you that when an elephant crooks its trunk and flaps its ears it is time to tread on the self-starter. And that is what we did.

It was dark when we got back to the highway, and there was still a long way to Nairobi. The beams of the headlights bored their way into the darkness and all our attention was concentrated on that limited field. Noiseless owls came swooping down to smash themselves against the windscreen or turn aside at the last second. Time after time a dik-dik, the loveliest dwarf antelope in Africa, as small as a fallow kid, with legs like pencils and hooves like little finger nails, crossed the road in a wild bound, and found safety on the other side. They looked as though they had jumped straight out of a Walt Disney film. In one place a flock of baboons were sitting on the edge of the ditch, their red behinds turned indelicately towards us. Some of them had babies that clung in terror to their mothers.

Now and again a sign appeared on the side of the road: a triangular sign with the simple warning, "Ford Ahead". Down into a gulley, through a river—narrow or broad, deep or shallow, you did not know which until you were there. It depended on the rainfall in the distant mountains. Sometimes traffic between Mombasa and Nairobi is interrupted for days, but we were lucky.

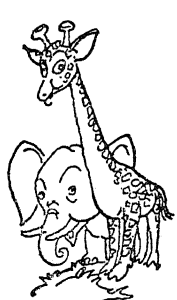
On the way up from one of these fords we were driving through a tunnel of trees in a sunken road.

Half way up the steep hill Olle had to brake. In front of the radiator was a giraffe, and we had only just avoided bumping into him. We crawled along in first gear. But the giraffe never turned round to see what was making the noise. It walked on in that fantastic sleep-walker's gait that you have probably seen in the safari films. There was no chance of it turning aside, for the side of the road was too steep even for a giraffe. It's white rump bobbed up and down in front of us like a ship in a big swell.

"It's a lie," I said. "This is highway No. 1 in the famous and highly developed agricultural colony of Kenya. We are driving in a car of 1951 model, and it is contrary to all common-sense that we should have to brake for elephants and giraffes. No one will believe it."

We reached Nairobi at one o'clock that night. There was some religious festival in progress, and the Aga Khan's Mosque was decorated with little coloured lamps and shone out like a lighthouse above the roofs.

I woke only once, when some hyenas knocked over the dustbin in the hotel yard.



CHAPTER V.

THE next stage of the voyage was to take us across the Indian Ocean to the Orient of our dreams. We left Mombasa in company with some Arab dhows, but there was hardly a breath of wind and *Galathea* soon left the ungainly craft behind.

A number of new members had joined the expedition at Mombasa, and in Ceylon we were to pick up English-born Professor Grace Pickford from Yale University, whose knowledge of cuttlefish and octopuses was so great that what she did not know was not worth knowing. Later, in Manilla, we expected to be joined by Professor Claude E. ZoBell from California University, one of the world's greatest authorities on marine bacteriology.

We began work at once. The silt-sampler was sent on its travels up and down and soon we were back in the old routine of water-samples, light measurements, temperatures, salt-content, etc., etc. There were dolphins at our bows, sharks in our wake; the engines thudded and life ran its normal course.

One morning the look-out on the bridge caught sight of a little green island. It was Bird Island, the most northerly of the Seychelles. *Galathea* made for the main island, Mahé, where we dropped anchor just before darkness fell, off Port Victoria, the capital of the group.

The flora and fauna of the Seychelles differ in many respects from those on the nearest mainlands. Perhaps the islands are the remains of a former great mainland which is presumed to have linked Africa with Asia. The only remains of this vanished continent, it is said, are the Seychelles and Madagascar, but nobody knows anything for certain. The matter is one of everlasting argument among geologists and zoologists. But one thing is certain and that is that the separation from those two continents must have taken place a very long time ago indeed if those species of plants and animals are new ones that have developed in the islands since, and not survivals from the very dawn of time, the only surviving representatives of the vegetation and fauna of a sunken continent.

We wished to obtain specimens of the fauna for our museums at home, and we succeeded in getting a sun-bird with a long, curved beak, like a humming-bird, and its ingeniously woven nest, and also a large collection of the nests and eggs of the three kinds of doves which live on the island—a grey turtle dove, a large dove like a ring dove, and another magnificent blue dove with a bright red head. Then there was a lizard that only lives on those islands, and three different kinds of gekko, to say nothing of all the centipedes, spiders and woodlice our scientists discovered in routing about among the roots of the trees and under mossy stones.

However important all these may have been scientifically, it was the double coconuts in which we others were interested. In the Seychelles there are six distinct varieties of palm which grow nowhere else in

the world. The most famous of these is *Lodoicea,* queen of the palms, and so exclusive that it will not even flourish on the main island, but is confined to one of the smaller ones called Praslin and a few of the islets lying off it. So famous is this plant in professional circles that if you but mention the word Praslin to a botanist in Chicago, Bergen or Peking he will at once reply "Cocos de mer" or "Lodoicea" or "the double coconut", and if a couple of hundred years ago you had happened to mention the double coconut to an Indian prince he would have opened his eyes wide and at once have offered you large sums in gold and jewels to get him but one of the famous nuts.

He would not have known, however, that they grew on the little island of Praslin in the Seychelles. In fact, he would have told you that the nuts grew on a tree deep below the surface of the sea on coral reefs off the coast of Java, and that the branches had the strange attribute that they bent down towards the sea floor whenever a native diver tried to pluck their precious fruit. Only rarely did one of these trees allow a nut to float to the surface. Then it drifted with the winds and the currents and finally reached the shores of India. Lucky then the man who found it, for he would be assured of youth and manly power until far into old age. Women would flock round him, his progeny would be numerous, and his fame would live for ever.

According to another tale the branches of this submarine tree of knowledge did rise above the surface, but its fruits were guarded by a terrible griffin, which every now and again would fly to the nearest land and

feed on tigers, elephants and rhinoceros—regal fare for the kingly bird that guarded the tree of fertility. If ships did not give the tree a wide berth, dreadful maelstroms would suck them in round the trunk, and there sat the griffin, for whom the hearts and kidneys of the poor sailors made a delectable meal.

The *cocos de mer* was thus a thing of fable along with the unicorn, the wer-wolf and the roc, until the Seychelles were discovered and it was found hanging a hundred and fifty feet above ground in a gigantic palm which grew in the narrow glens of the island of Praslin. It was nuts from the trees near the shore that had drifted across the seas and stranded on the coast of India, where their sudden appearance had stimulated people's imagination and given rise to all sorts of fantastic tales.

These nuts weigh up to forty pounds apiece, so that if you wish to pluck one you should avoid shaking them off. There was a time when the princes of India would pay for them with their weight in gold, and even to-day they would fetch a very high price, for they are rarities, and you require a special export licence from the Governor before one may be taken from the island. Only three hundred are harvested each year. *Galathea* had been given permission to gather ten of those nuts to send home to the botanical garden in Copenhagen.

The home of the nuts is the Vallée de Mai, a remote and inaccessible glen on the little island of Praslin. Here time seems to have stood still for thousands of years. The rays of the sun slant down through a green twilight and make the scene like a submarine landscape. High

above the crests of the other trees *Lodoicea* waves her plume of green leaves among which the heavy nuts hang from stalks that are as thick as a seaman's arm.

Apart from a few brief visits from adventurers and explorers whose business lay elsewhere, the Seychelles have only been known since 1770, when the French settled on the islands and began to colonize them in a minor way. Although the English took the islands over in 1814 after Napoleon's fall, the language of the islands is till Creole French. In fact, you do not notice any English influence: the place-names are French, the language is French, the mentality is French, while so slight is the importance of the islands in the economics of Empire that it is considered enough to send the very minimum number of officials. There is no newspaper and nobody misses one.

Before the French colonized the group the islands were uninhabited. There is nothing to show that people ever had lived in the Seychelles before the French took them there. Some went voluntarily, others were brought as slaves from the east coast of Africa to be used on the plantations that were being started; others came as liberated slaves, for slave ships which were being pursued used to put into the lee of the island and rid themselves as quickly as possible of their live cargoes before the men-of-war could catch them. Thus to-day the islands are inhabited by a mixture of all conceivable races with the colour of the African negro the dominant one.

Many members of *Galathea's* crew were convinced that they had come to Paradise. Nor were they the first

to think that. General Gordon, the hero of Khartoum, insisted most seriously that the Seychelles had been the original Garden of Eden of the Bible. And he was convinced that the famous double coconut was the fruit on the Tree of Knowledge. However this may be, the stranger who goes ashore on those lonely islands is met with a friendliness and trust that have long disappeared from our insecure world, where everybody goes in trembling fear of atom spies and saboteurs, things unknown beneath this blue tropic sky where there are no newspapers and no wireless to keep people's fears alive. Only once a month do the islands receive a visit from outside, when the schooner from Mombasa comes, bringing letters and an occasional tourist, who will return with the same boat, too enchanted by his vision of Paradise to have spoken of the hell from which he came.

In all the woods and plantations grow cinnamon trees and vanilla. The whole of the main street in little Port Victoria smells like an old-fashioned chemist's and dry-salter's shop. From among a number of indefinable smells you can easily distinguish those of cinnamon, vanilla and patchouli. Cocoa, breadfruit, oranges, papaya, fish from the lagoon, salt from the salt-pans—Paradise is self-supporting and lives its own carefree life far from the steamer routes of the Indian Ocean. The area of the ninety-two little islands comprising the group is 400 square kilometres. The total population 44,000. That is all the size of Paradise.

Many of us, I know, wished that time could have stayed still, but we had only three days to spend there, and so on to Ceylon.

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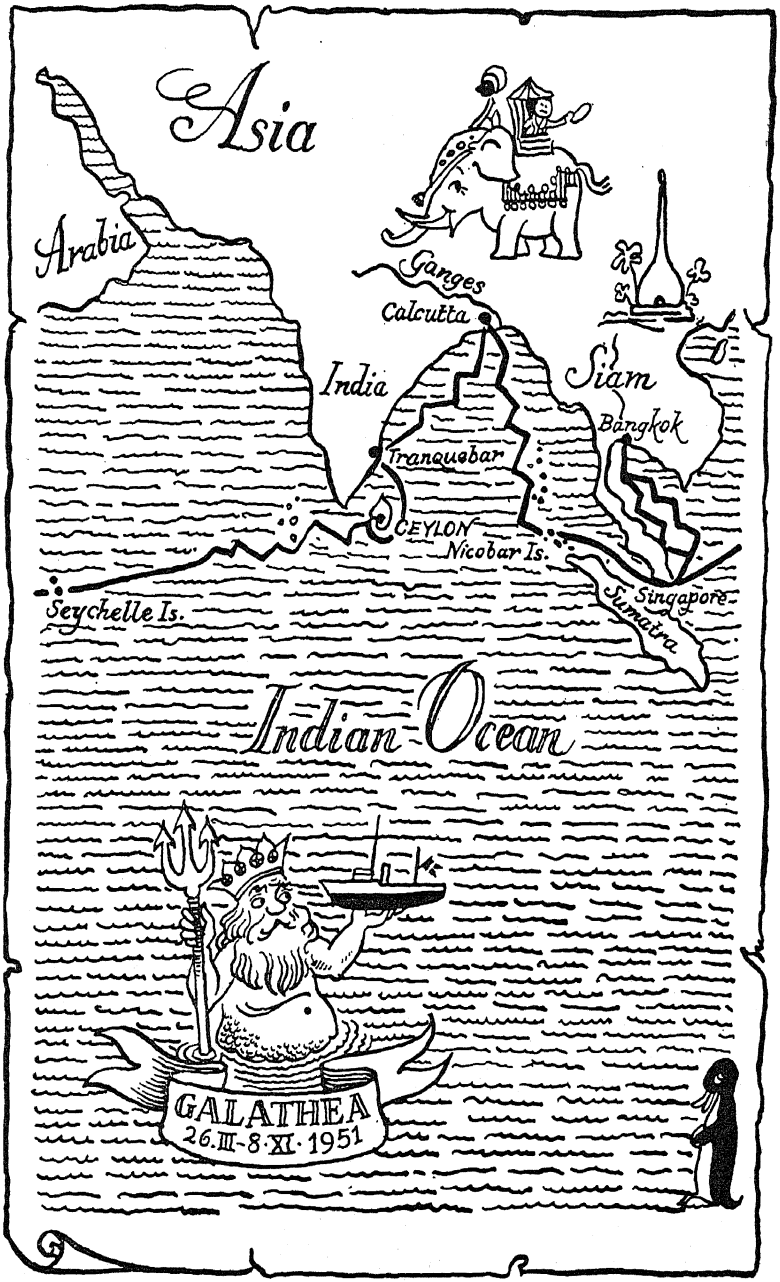
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Sumatra
Indian Ocean
GALATHEA
26.III-8.XI.1951

We were driven all over the island of Ceylon and saw it in all its beauty. We drove across water-courses, where delighted naked children splashed about round elephants lying on their sides in the water, luxuriating in the ministrations of their mahouts who used large stones on their thick hides instead of scrubbing brushes. We saw dead trees with thousands of large black fruits hanging from the branches, and when someone clapped their hands all the fruits spread wings as black as night and swirled off through the air to circle against the blue of the sky, like flying devils in a Walt Disney film. Those were flying foxes, the large fruit-eating bats that are as common in Ceylon as crows in Europe, but of the very essence of adventure for young sailor boys. We passed green meadows where naked men were shovelling damp earth out of deep pits while tilt-cranes emptied the water oozing up from the bottom. We saw other naked men putting the earth into pans of woven straw and swilling the pans with a circular motion in a river or pool of water. At the end at the bottom of the pan would be a couple of handfuls of stones: these would be turned and twisted and tested against a primitive whetstone, and every now and again one of these insignificant stones would prove to be an emerald, a ruby or a sapphire. Ceylon has them all; Ceylon has everything that can enchant a man coming from the sober north. Ceylon overwhelmed us with the richness of its impressions. It was our real introduction to the East.

We sailed along the coast past the places where Admiral Ove Gjedde went ashore when he arrived at the beginning of the seventeenth century to see that

Denmark got her share of the riches coming out of the East. He settled in Tranquebar opposite the north-west of Ceylon, and there Steen Bille had to go in our predecessor *Galathea* in the middle of the nineteenth century to wind up the colony the other had founded.

Tranquebar is not easy to see from the sea. The coast line is low and uniform, and neither chart nor sailing directions give much information about it. Curious fishermen paddled out to meet us, their type of craft unchanged since the days of the first *Galathea* and long, long before that. A more primitive vessel can hardly ever have existed. By comparison the Kon Tiki raft was a miracle of technique. Here you take three or four palm trunks, lash them together with rope made of coconut fibre, and go out to sea to fish with nets that you have made yourself of lianas and coconut fibre. It's the stone age pure and simple, and the naked brown men of that coast have kept on using that type of craft ever since then, irrespective of what was happening elsewhere in their country.

The Danish founders of Tranquebar built churches and palaces and everything else that a prosperous colony required, including a paper mill. And it was from Tranquebar that the first missionaries set out to preach the new-fangled Protestant faith in old India. In its hey-day there were twenty thousand inhabitants; to-day there are seventeen hundred.

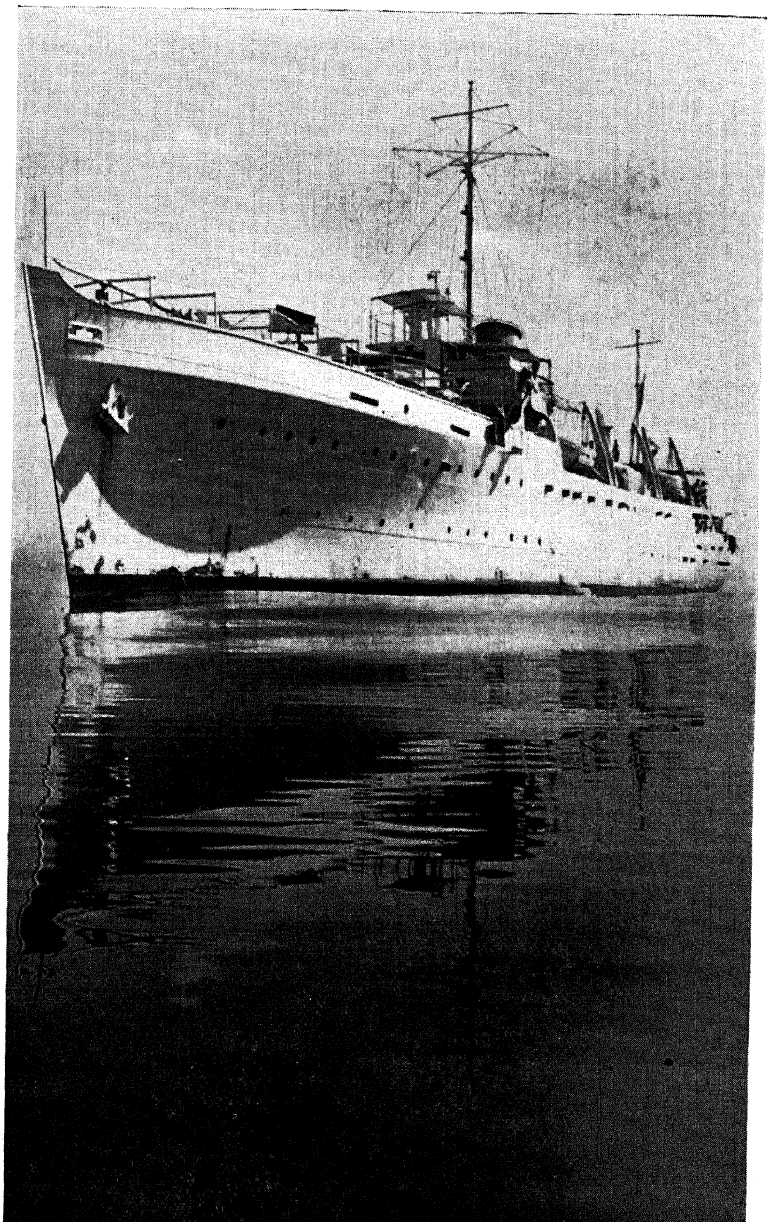
Denmark sold Tranquebar and her other Indian colony, Serampore, to England for 1,225,000 rigsdalers.

That was in 1845. To-day, the town lies partly in ruins.

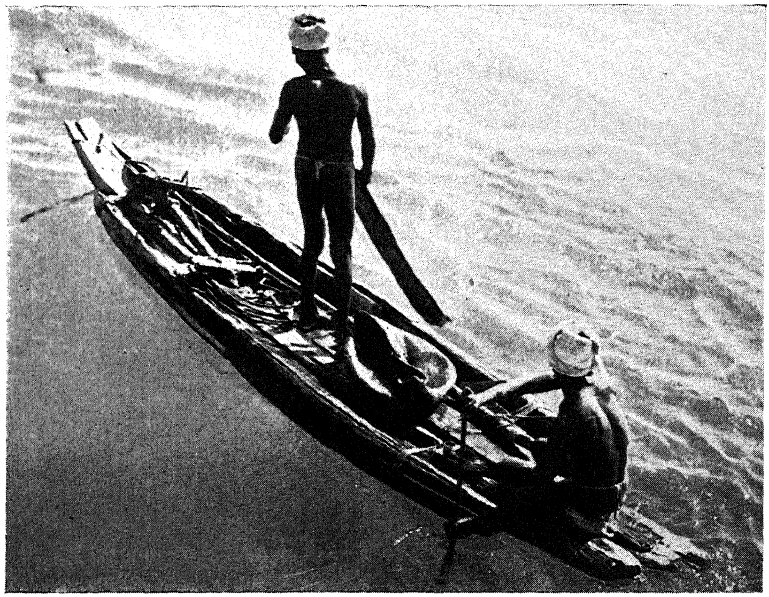
Galathea fired a salute of three guns in honour of the past, and all the natives who had followed our boats out to the ship in their Stone Age craft went rigid with terror, until they saw our smiling faces and realized that it was only another of the white man's curious antics. And so the screws began to turn and *Galathea* was on her way once more.

The next day the trawl was put out at 1083 fathoms with excellent results. Only there were no *Vampyrotheutis* in the meshes which was a great disappointment to Professor Grace Pickford, for she was a specialist on *Vampyrotheutis* and had come all the way from Yale University for its sake. Turtles and sea-serpents swam around the ship and the air was stifling even out at sea. The water became more and more shallow, the silt-sampler brought up soft mud. We were drawing near land and the wide mouth of the river Ganges.

Four months, four years would not be enough to get any idea of India, and four days was all the time we had. It was not even long enough to get to know Calcutta, let alone the country that has so long symbolized all the romance and mystery of the East. In Calcutta to-day, all that romance is drowned in the stench of poverty and the groaning of famine and the death rattles of the starving people who daily die of cholera. You forget the magnificence of the peacock in listening to the hoarse cries of the vulture and the memory of red, green and blue jewels fades beneath the impression of thousands of black, childish eyes staring at one in apathetic dullness from the gutters of the narrow streets.



The Indian Ocean was like a mirror when *Galathea* left Mombasa



The Stone Age craft of the natives came out to stare at *Galathea* when she visited Tranquebar

Once a year the people of the Nicobar Islands dig up the skulls of their relatives and dress them up like this

At the end of our allotted four days, we sailed out from the mouth of the Ganges, and in the grey of one early morning we anchored off the township of Malacca, on the Strait that separates Nancovry from its neighbouring island, Kamorta.

The usual officials came out in a canoe, two policemen and an Indian doctor, Dr. Ramanand, who became our guide and interpreter during our stay at the Nicobars.

The inhabitants of Malacca and the neighbouring town, Inunga, are Christians. Between the two towns is a rickety church, built at the spot where you can still see the stone foundations of the previous structure, built by the Herrnhut Mission. Each Sunday its bell calls the faithful of the two villages to High Mass. The bell is an empty compressed air cylinder left behind by the Japanese occupation troops, and now hung up in a tree. Only two of the citizens of Malacca are not Christians: one is the queen, who maintains that she is too old to be baptized; the other, the merchant, who is an out and out Moslem, and as such, engaged in unremitting warfare against the swarms of unclean pigs who are always getting into his domain despite the fence that he has put up round his entire property. However, everybody, whether Moslem, Christian, or common or garden heathen, as the queen was, makes some sort of compromise with the faith of their fathers.

Down by the water's edge were several bamboo erections decorated with strips of cloth and leaves like a maypole. These were not scarecrows but they were meant to scare away evil spirits. Spirits simply can't

stand fluttering bits of cloth. In every hut too you will find, either standing or hanging, carved figures whose duty it is to shoo away such spirits as may either be immune to fluttering bits of cloth, or so bold as to have sneaked round them and got into the hut that way. There, inside, they are met by these terrifying pictures of devils. These have latterly become somewhat modernized. Many of them represented Japanese parachutists with steel helmets and khaki uniforms and wings on their backs. Doubly devils.

The queen received Dr. Bruun and Commander Greve in a dignified and natural manner. She received their homage as a matter of course and in return gave them a beaming smile. The black stumps of her teeth and the flame colour of her mouth betrayed a passion for betel nut. When she returned their visit, the queen used the quarter-master's inking pad, and set the impression of her thumb in our visitor's book, for Her Majesty has never learnt to write.

Four members of the Expedition went off in search of prehistoric remains, but without finding any. Wolff was the only one on board who seemed able to nose out what was really good, and he was also the only one who could deal with native merchants in such a way that they let him have the goods for what he offered. Certain merchants in the bazaars of Colombo and Calcutta still wail when they think of the prices Wolff persuaded them to accept for what were real works of art, and did they but know it, they have companions in distress in the Seychelles, Mombasa and Durban. There is nothing unfair in that, for though Wolff may have

pulled their beards, they and their fellows stung all the other members of the ship.

The people of Nicobar will never forget the day when a lanky white man off a foreign ship went through their huts and paid cigarettes and fishhooks to be allowed to clear their lumber rooms.

Outside the huts would be a pile of carved devils, old coconut shells and other household utensils of coconut so worn after years of use that it had been decided to get rid of them as soon as there was the money to buy a modern tin plate from the Moslem trader. Apparently this lanky creature was mad and omniverous; always he seemed to choose what was old and worthless. For example, he paid two and even three cigarettes for father's old confirmation speech. They almost blushed at the thought of how they had done the white man, even though he had more than met them half way.

Ethnographically it would perhaps be more correct to say confirmation tablet rather than speech, but the meaning is the same. With us in Denmark father stands up clutching his glass, adjusts his tie and embarks on a speech. In the Nicobars, however, he seizes his knife and cuts what he wants to say in hieroglyphics on a wooden tablet which is set up beside the hut as soon as a child reaches confirmation age and is to enter the ranks of the grown-ups. Father might have been very or not so eloquent, his hieroglyphics pretty primitive or the utter refinement of line and colour; but good or bad, when confirmation was over, the tablet was thrown

onto the rubbish heap from which Wolff rescued it to the great merriment of the family.

Wolff's greatest achievement, however, was the canoe he acquired on the island of Kondul the day *Galathea* left the Nicobars. It was hollowed out from the trunk of a single tree and had an outrigger. It was a typical canoe and had already seen considerable service. Wolff got it for 37s. 6d. which is quite a reasonable price for a perfectly seaworthy craft.

Our stay coincided with the annual memorial feast the village of Moshoit held in memory of its dead, and the queen invited twelve persons from *Galathea* to attend it with her. The village was some eight miles from Nancovry, and we set out in a motor-boat as darkness fell.

When someone dies in the Nicobars the body is buried very primitively and almost without ceremony. But the dead leave their restless souls behind in the society they themselves have left. Perhaps such a soul will take up residence in a relative, a most unpleasant occurrence for the person concerned, as it will manifest itself as malaria, lunacy or as a succession of accidents. Other of these restless spirits flutter about without any fixed residence and are generally malicious and harmful to any who get in their way. It is to frighten them that those maypoles are set up between the huts, and that people carve images of devils and set them up in their homes.

In the local language the spirit of a dead person is called his *ivi*, and every attempt is made to entice it into the grave beside the dead man's body. A choice

assortment of food and drink is placed in the grave, but in case the *ivi* should not be a devotee of the fleshpots and spiteful enough to consider taking up residence in a relative, means must be found of convincing it that to do so would not be worth while. One member of the family gives up eating fish, so if the *ivi* should settle in him it would discover that there was something lacking in its diet. It would be disappointed, for an *ivi* is naturally just as fond of fish as anybody else in the Nicobar Islands. It might then try its luck in a young girl, but she gives up coconut in every form, and uncle stops eating bananas, an aunt will no longer touch the pudding made from the nuts of the pandanus palm which is the favourite dish of the Nicobar Islander. Then perhaps the *ivi* tries a younger brother, but he who used to smoke like a chimney, has given up tobacco since the scare about the dead person's spirit, as heroically as the son-in-law who has been denying himself all fermented palm juice which previously used to occasion him at least two hangovers a week. The poor spirit goes from person to person and finds nothing but disappointment wherever it goes. This existence continues for a year, until the next festival for the dead is held, an occasion on which the people go to incredible lengths to ingratiate themselves with the restless *ivis*.

For two hours *Galathea's* motor-boat chugged across the dark sea with a native pilot in her bows. The phosphorescence was like a cloud of sparks in the wake, and if you dipped your hand into the warm water, gold and phosphorus dripped from the tips of your fingers when you withdrew it. We went through a gap in the ring reef, scarcely a hundred yards wide. Lights shone

out ahead and canoes slid up out of the darkness to take the visitors ashore across the shallow water where the motorboat could not go.

The Chief of Moshoit, a tall, grave man, appeared out of the darkness. Along the beach lay canoes decked with flags and flowers, which had brought guests from other islands and villages. The queen was carried ashore, which was a job for the strongest man in the village. He swayed dangerously, but catastrophe was avoided. The heir-apparent was not with us, having found himself at the last moment too drunk to accompany us. He had previously gone to the doctor and had a paroxysm of coughing, an excellent performance that had earned him a bottle of yellow cough mixture, and our cough mixture was very strong.

We clambered up a six foot rickety ladder into one of the largest huts in the village. In the flickering light from twenty or thirty mussel shells filled with cocus oil in which swam wicks, sat a score of women in a circle on the floor. Some were young and some were old, some were lovely and some were toothless crones. They sat with their legs crossed, wailing softly. In her lap each had a skull, its empty eye sockets staring at the faint flickering lights, the rows of grinning teeth showed that the dead had also been devotees of betel chewing, for the teeth were black and rotten. The skulls did not have the contrast of the scarlet mouth, and so the black was more macabre than ever. The women's song was mournful and long drawn out, rising at times to a wailing cry. The skulls were wrapped in highly-coloured rugs, and each was topped with a headdress,

in some cases this was an ingenious framework, in others a modern hat. One wore a topee, another a top hat bearing obvious signs of the work of time, damp and insects. In its hat band were stuck flowers, leaves, rusty nails, sticks wound round with cloth, and aluminium and tin forks and teaspoons. The best in the house is not too good for the spirits of the dead. It is they the people feast when the skulls are dug up from the ground and taken into the huts, and the oil lights are lit and set before them.

"Come all ye *ivis* and see how well we care for the mortal frames that you abandoned. Come and see what you are missing by fluttering about on your own and causing misfortunes. If you had remained down there where you belong, you too, would have been well provided. Take a good look and see what is placed there before each skull—the most delicious coconuts, pork with fresh crackling, yams, fish, bananas and the pandanus pudding that you liked so much when you were alive. Look, in front of this one is a jar of palm wine, and in front of that one a bundle of home-rolled cigars."

Under the roof hung the entrails of freshly slaughtered pigs and some lovely half-rotten meat. The smell of the skulls, cocus oil, pigs' entrails and human exhalations formed an indescribable whole in that hut which had no window. The song of lament continued, young men got up and danced a round dance, circling behind the wailing women, the sweat on their bodies gleaming in the lamplight as they tramped round and round, rhythmically and monotonously. The

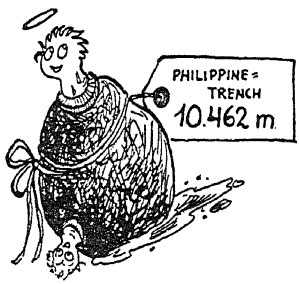
occasional shrieks of the women rang out mournfully to the twinkling stars, their wails sent a shiver through your body. And so the dance and song continued, tirelessly, throughout the night.

The Feast of the Dead lasts four days and nights, during which time all rules of abstention are broken. The village contains such a superabundance of food that the *ivis* have no time to think up unpleasantness, and if it is considered that the feast has been so successful that the *ivis* have repented, the people's voluntary fast comes to an immediate end. We were the guests of the richest man in the village who could afford to feast twenty disinterred skulls of his immediate family. In the smaller huts they were feasting one or two skulls. Even here there were certain differences in social rank.

The Chief invited us to supper in the village shop. We had brought our own basket of provisions as well as rich gifts for the village, such as layer cake, the Danish flag on a shiny metal flag pole, spirits, cigarettes and photographs of *Galathea*. The queen drank the spirits as though it had been water, but Dr. Ramanand said it wasn't good for the teeth and so the chief was not allowed any, which made him very surly. The queen sat in a deck chair and it collapsed under her, but all the same it was a lovely funeral, and when day broke the motor-boat was loaded with bananas, a large, live pig, eggs, coconuts, a hen, a cock, pineapples and sugar cane, the Nicobar Islanders' parting gifts to their strange guests who caught flies with fish-nets and picked things off their rubbish heaps.

The motor started and the familiar smell of petrol drowned the stench of skull and entrail that still lingered in our nostrils.

CHAPTER VI.



We headed southwards for Singapore which has the most temples and the greatest number of dance restaurants of any city in the East. Here we discovered that the winch motor required repairing, and while this was being done *Galathea* went on a visit of state to Bangkok. On her return the motor was put back in its place and a long steel wire was trundled along the quay on its huge wooden drum and hauled aboard. It was a wire of 12,000 metres, spun in the one piece, nine millimetres thick at one end and twenty-two millimetres at the other. It weighed ten tons. This was the wire with which *Galathea* hoped to get to the bottom of the great trenches off the Philippines and the Tonga Islands.

All this work was done in Singapore's naval base which was twenty miles from the city itself. The navy gave us free transport in its buses to Singapore on the other side of the island. One evening the driver taking us back to the ship seemed to be unusually tense and kept his gaze riveted anxiously on the road ahead of him.

"Anything wrong?"

"Nothing except that a tiger is roaming about the station here. They saw its tracks this morning. It had

swum across the Sound from Johore. It had been frightened by the bombs in the jungle, I expect."

That tiger was never caught, although troops armed with rifles drove the country for it. The supposition was that it was so terrified by the hubbub in Singapore that it swam back to face the bombs. At any rate, the newspapers reported the next day that a tiger had eaten three people just across the Sound.

Singapore is a Chinese city conquered from the Malays without ever a blow being struck. The indolent, smiling Malay has cheerfully let the Chinaman move in and occupy all the best places in retail trade and the professions. The Malay prefers a job in Government service, or to be a taxi-driver with a new American car, carving himself a way with his horn through the swarms of Chinese.

The Malay has innate charm, a certain grace of movement, an age-old culture and breeding which is obvious even when he lives in a straw hut with a floor of trodden earth and eats his rice out of an old petrol tin with his fingers. He is intelligent. He is a diplomat. He is a fool, say some. Of course he is. He cannot understand that anyone can waste hours of God's sunshine working his fingers to the bone when his stomach is already full and he has somewhere to sleep.

Anybody who has passed through Singapore knows the Bokhara carpet house, so we too paid a visit to that fairy-tale place. It didn't matter in the least that we were unable to buy. The owners knew that the moment they saw us. Those who deal in carpets are psychologists. They are also aesthetes and love their carpets, so they

did not worry about our poverty, but gladly spread their wares before our wondering eyes, told us their history and what each ornament signified. It is the number of knots per square inch that decides the value of a carpet. The coarsest and cheapest have 150 to 200 knots, the finest over 2,000.

There were several of us who went up there to enjoy an orgy of colour and pattern. We were seated on a pile of Persian rugs worth several thousand pounds, and while we drank golden Indian tea out of Chinese porcelain cups, sweetened with sugar from Java, the carpet dealer spread one wonder after the other before our eyes. When we left we felt as though we had been watching a performance in the Palace of Haroun Al Raschid, and it was a little difficult to resign ourselves to the coconut matting that lay on top of the lino in our cabins.

I have said that *Galathea* went on a visit of state to Bangkok. It was there that I met Mrs. Yip-in-Tsoi. Mrs. Yip-in-Tsoi was a Chinese and lived in one of the suburbs in a sweet little house in the middle of a wonderful garden. She had a daughter living in Copenhagen, and had been to Denmark several times. She is one of the most charming women east of Suez, and it was gracious of Buddha to have brought our paths together. She invited me to a Chinese dinner.

For hors d'oeuvre we had ducks' eggs. The eggs had been laid for three weeks in ammoniac. Then they had been buried, mixed with salt, in the ground and left there for half a year. After hors d'oeuvre came the soup, chicken soup with dried mushrooms which had been

steamed in a hollow gourd. Then fish boiled in coconut milk and curry, laid on top of Chinese celery heads, dried out and served in a cup of woven green banana fibre. Then followed a sausage made of shrimps with ginger and tamarind sauce; then as entrée, satay chicken, pork and liver skewered on the ribs of palm leaves and dipped in pepper sauce. We continued with spring roll, a thin sort of pancake wrapped round a filling of meat, shrimps, crab's meat and bamboo shoots and then fried in deep fat. Then came crisp lacquered crunchy Sechuan duck.

Our ivory chopsticks moved slower and slower, and the whole time we sipped at millet brandy of venerable age, quite unlike the harsh drink served in the public bars. Then came an orgy of tropical fruits, spiked yellowy-red rambutan, deep mauve mangostines, liches like small golf balls, mangoes, pineapples, bananas, followed by fragrant coffee.

It was an introduction to the age-old art of Chinese cooking and of Chinese eating, which is a search for the best, the most elegant, and the most surprising. You pick a little here, take a little there. There is no shovelling with a spoon or fork, but elegant picking with chopsticks, and each blends his own spices in accordance with individual taste. Naturally, neither ancient egg, shark fin soup, nor even swallow's nest taste in any way barbaric when prepared in the correct manner. For Chinese cooking is as far from the barbaric as the culinary art can be. It is an expression of a highly refined, perhaps to our more primitive palates, a slightly degenerate culture. It is a prodigal art that

selects the very best and throws away the rest. You do not feel bloated or sluggish when you get up from even the longest and most complicated meal, and yet Mrs. Yip-in-Tsoi said that she was very fond of Danish cooking. How polite the Chinese are.

* * * * *

When we left Singapore it was with course set for the Philippines. It was pleasant to get back to work, and soon we were in the old rhythm again. One trawl brought up a fantastic creature, the best description for which is that it resembled a small and well upholstered saddle for a lady's bicycle. However, we had not fished up the oceanic equivalent of the old boot, for after much discussion our zoologists agreed that it was a hitherto unknown member of the sea's fauna, and was to be sent home for further examination.

The China Sea greeted us with a following wind and heat like a furnace. *Galathea* was not built for the tropics. There had been no time to insulate the floors properly, nor had our funds run to the installation of air conditioning anywhere in the ship. The steam pipes ran along the floors and ceilings, and when the winches were in use, the engines turning and the distillation plant in full swing, many of the floors were hot enough to make a bear dance. In my cabin the temperature had remained between eighty-five and ninety-five degrees Fahrenheit ever since South Africa, both day and night. It was worst at night because you could not sleep properly. We were all more or less affected by prickly heat and resembled so many plaice. The worst affected

was the ship's doctor, which was as it should have been, seeing how little he was able to help us.

One of our visiting scientists had been Dr. Volsoe, an expert on sea serpents. He had been with us in the Bay of Bengal, when he fished for sea serpents with lights. Some of them are deadly, as poisonous as cobras. One evening he caught thirty. When he came to separate them out in the aquarium there were twenty-nine. Later that night the bo'sun went into the Petty Officers' Mess where a dear little sea serpent some two feet long lay rolled up in a corner and hissed at him. If Dr. Valsoe had remained on board no one would have dared go to bed at night.

There were other creatures to be found here and there about the ship. There were several chameleons at liberty, and there was supposed to be a gekko somewhere or other. One afternoon the signals quartermaster was using a wall telephone in the passage outside the laboratory. As he stood waiting, without thinking what he was doing he prodded with a screwdriver at a black electric wire rolled round the automatic dial, a place no wire had any business to be. The wire did not like that, began to unroll itself and hissed at him. It was a thin little land snake that had been posted missing for several days.

For one reason or another everybody in the ship was taking an interest in zoology. The man whose job it was to look after the innumerable pumps, and who spent the day going from deck to deck with a very heavy case of tools, was already informing us that he intended to acquire a kangaroo in Australia which he

would train to hop after him with his tools in its pouch.

One night we saw the beams of lighthouses sweeping across the horizon in the east: there lay the Philippines.

At daybreak we sailed in through the narrow entrance to the Bay at the end of which lay Manila. There we were greeted by three vessels belonging to the Fisheries Society of the Philippines, an institution which is a sort of cross between a biological station and a College of Fishery. Its activities ranged from scientific research to practical instruction in marine engines and fishing appliances. It had its offices in a fantastic building half shot away, with rubble in the courtyards and its walls perforated with grenades. Headless statues without arms stood unsteadily on Grecian pillars made of cement cast round an iron rod, but there was plenty of work being done in the bomb-damaged rooms.

The people in that war-ravaged city seemed to wish to do everything to help and entertain us. The newness of their country was still very much with them, and they spoke openly of corruption and roaming bands in the mountains. They advised us not to go out in the streets alone at night, admitting that the organization of their police force still left much to be desired. They made no attempt to hide the fact that they were unable to do anything to stop the murky traffic of smuggled goods and undesirable emigrants into the more than 7,000 islands which comprise the Republic of the Philippines. But what could anyone have done? Their coast line was twice the length of that of the United States, and

Asia
Japan
Pacific Ocean
Luzon
Manila
Philippine deep
Siam
Bangkok
Cebu
Bugo
Mindanao
Basilan
New
Guinea
Pt. Moresby
Solomon Is.
deep
Borneo
Balikpapan
Celebes
Macassar
Singapore
Sumatra
Djakarta
Thursday Island
Torres Strait
Bali
Java Trench
Indian
Ocean
Brisbane
Australia

they had only a handful of excise men and coastguards to control it. The people in the more remote islands and mountain valleys were without national aspirations and their sense of community was still restricted to that of the tribe. The various primitive tribes in the interior still waged war against each other, head hunting was practised here and there, and, once beyond where the roads ended and the rain forest began, paganism was general. There are still unexplored areas on Mindanao and in the north of Luzon where foreigners are strongly advised not to intrude.

The period of American rule from 1898 to 1946 almost put an end to the use of Spanish in the Philippines. English is the dominant language, and it is essential that there should be an auxiliary common tongue, for there are almost one hundred different languages, not just dialects, spoken in the islands. Thousands of years of isolation in valleys and mountains, and of continual warfare between neighbouring tribes, split the people into small groups which have each created their own language. Nowadays, all newspapers and schoolbooks are printed in English; the films speak English.

In the Philippines we were joined by Professor Claude ZoBell, one of the world's leading experts on marine bacteriology. He was a man of very considerable energy, and he even got me to start reading his magnum opus *Marine Microbiology*. The very first page revolutionized my conception of the importance of the different creatures of the sea in Nature's economy. For me the whale had always been the dominant inhabitant

of the sea. After that, the codfish, boiled plaice, smoked eel and peeled shrimps, but ZoBell convinced me that I was on the wrong track. Neither size nor method of preparation count. The whale, cod, eel and shrimp all might just as well pack up, were there no bacteria present in the water and in the sea floor.

Bacteria slip unhindered in and out through traps and nets. They don't take hooks and cannot be speared. They can only be observed by those who are armed with a microscope and patience and more knowledge than normal mortals acquire.

Apparently bacteria are madly busy making food for other creatures in the sea and reproducing themselves so as to replace the quantities of bacteria that must themselves function as food for those a little higher up the zoological ladder. They dissolve the remains of animals and plants and cause chemical changes both here and there.

You find bacteria both up at the top and down at the bottom. They drift about on the surface, bustle about among toad-fish and other lantern bearers in the dark depths around 2,660 fathoms, and they have been found buried in the mud at 3,330 fathoms. Whether they can live at the greatest depths of over 5,000 fathoms ZoBell was unable to tell us, and it was in the hope of finding out that he had come aboard.

* * * * *

We were now all complete and ready for the great venture of the Philippine Trench. *Galathea* steamed out through the San Bernadino Strait and headed south.

Luzon lay to the north-east, Mindoro to the south-west, and ahead of us the blue shapes of Masbate and Samar were outlined against a sky flushed with the reflection of the setting sun. Were there navigable waterways in the Garden of Eden they must in beauty have been similar to those. Up to the sky rose the mountains now as soft domes, now serrated like the teeth in a wolf's jaw. Here the cliffs rose sheer from the white collar of the surf, there a narrow green belt of land had thrust in between the mountain and the sea.

Green the land was, green with coconut palms, green with young rice and green with the bushes and trees of the mangroves that had pulled up their trousers and waded out into the sea on stalky brown legs. And that green continued on across the island in the matted luxuriance of the rain-forest, in the grass of the open spaces where once a cyclone had ravaged or a fire eaten its way, or where brown pioneers had attacked the mountain slopes with machete and fire to wrest a patch of tillable land from the forest, just enough for a few beans, some bananas and a couple of breadfruit trees.

The blue smoke of bonfires drifted lazily down the valleys. The peasants were burning wood refuse.

Down by the shore some fishermen were getting their boats ready for the evening fishing; slender canoes they were, hewn and burned out of a tree trunk from the forest, fitted with a double outrigger, two thick bamboo floats, one on either side, fastened to the craft by a couple of thin stays. Primitive vessels they were, but still an indispensable part of daily life in the Pacific. They were like aquatic insects, or like skaters,

as they slid across the calm surface of the water under a sail that seemed far too large for such sticks of craft and steered by a roughly shaped paddle—antiquity come to life.

When the sun goes down the islands are fringed with fishing vessels. The Philippine islanders fish with lights. Strong paraffin lamps are lighted one after the other along the coast to the despair of the sailor who has to grope his way through the darkness in waters that are full of rocks and where you cannot be sure of the buoys nor rely on the lighthouses.

Those hundreds of lights make a splendid spectacle, but on the way to and from the fishing grounds the islanders, being parsimonious, extinguish them, and rely on the strength of their lungs to turn aside the sharp bows of any steamer that might come too close, or they will light their lamps again at the last moment or strike a whole box of matches at once in touching faith in the attentiveness of the look-out and the ability of the officer-of-the-watch to react swiftly. But on the other hand they do not run the same risk of equipment being ruined by shipping as there always is in our Northern waters, for the Philippine fisherman have not yet advanced as far as trawls and nets: he fishes with hook and line or with a plunge-net that is lowered and raised in the circle of light from his lamp.

Heaven knows what they thought of us, those poor fisher folk in their fragile craft, if they so much as gave us a thought. And if they knew what was the business that had brought us there they would never dream that their vessel and ours were in one way afloat on the same

errand, that we were to solve problems which perhaps in a generation or two might be of importance for the world's fishermen and show those of Luzon new ways and means.

The last rays of the setting sun still caught Mayon, the Philippines' large and still active volcano, above whose majestic Fujiyama-like cone a column of smoke bulged up to meet the clouds that came drifting in from off the sea to attach themselves to the mountain sides like wet wads of cottonwool and efface all contours. One last glimpse of the majesty of Mount Mayon and then the sun disappeared behind the silhouette of Tabla and we headed through the Bernardino Straits and out into the great pacific seas.

The Pacific . . .

It was a moonlight night and there wasn't a ripple on the surface. The swell was all but imperceptible and you scarcely noticed the ship move. The heat was not so oppressive as it had been those last few months. The thermometer on the bridge had crept back to 28°C.

The temperature of the sea was 29°C. The weather ideal for the work of the next few days.

All of the ship's company who could, assembled on the boatdeck to hear the geographer of the expedition tell us about that which lay ahead: the Philippine Trench. Never has a lecture been listened to with such interest, for every man on board realized that we had entered upon the most important phase of the expedition. Up till then, where we had fished, others had fished before us. In several of the places this

amounted to no more than a few attempts made at intervals of fifty years or so and undertaken with tools that would not bear comparison with those we had. Where *Challenger* had caught one fish of a kind not afterwards caught again, we with our large trawl had caught 20 or 30 of the same species. That net of ours had also brought up specimens of several species that had never been fished before, but all the same, we had been working in waters where others had preceded us, few and slight as their efforts may have been. Where we were now heading, however, was a deep that no one had sounded, from whose bottom no one had ever taken samples, nor any trawl ever scraped across it. We had the chance once more to write the name of Denmark in the annals of oceanography.

Galathea was steaming at 12 knots towards the Philippine Trench and the atmosphere on board was more electric than it had yet been.

Astern, the lovely shape of the volcano, Mayon, was outlined against the last glow of daylight. Ahead of us lay the trench. Above us hung the moon, spanning the distance between us and our workplace to the east with an inviting bridge of gold. There was no more than a faint stirring of air coming out of the south; the thump of the engines was friendly and harmonious in our ears. Up on the bridge the echo-sounder was ticking away and marking its regular dots on the moving roll of paper: 500 fathoms, 1,000 fathoms, 1,500 fathoms. The downward gradient was fairly uniform. 2,500 fathoms, 3,250 fathoms. Now we were on the edge of the Trench. 4,333 fathoms. . . .

But let us soothe our nerves and listen to what the expedition's geographer was saying on the boatdeck:

It was nine months since we had left Copenhagen and a good third of the expedition had been accomplished. In that time we had made a thorough examination of all the greater depths and had been down to 5,000-6,000 metres with all the modern tools that we had. They had fulfilled our expectations. Some minor defects had been corrected. We had acquired confidence, and our practices had brought to light sufficient valuable material to justify the expedition, even if the days now ahead of us were to go other than we had dreamed. We had provided a basis for a comparison of life in the greatest depths of the Atlantic and Indian Oceans. Now we were going to attack the Pacific.

We were going to obtain the first information about a deep-sea country that was as unknown to us as America had been before Columbus' voyage.

Only twice before had an expedition caught live creatures at a depth of 4,225 fathoms. Deeper than that no instruments had yet been.

What were conditions of life at 5,800 fathoms? Could all the things on which organic life depends even withstand a pressure of over 1,000 atmospheres?—a column of water nearly 34,000 feet high resting on each square inch of the bottom?

How would fats, albumen and enzymes behave under those conditions? Could even bacteria live under them? One had to remember that an egg subjected to great pressure reacts as though it were

being boiled: the white sets. On board we had Professor ZoBell, the only person in the world to have specialized in work on bacteria under high pressure—but even he had never had an opportunity of experimenting with bacteria from greater depths than 3,250 fathoms and experiments had shown that these bacteria died when the pressure reached 800 atmospheres.

How deep was the Philippine Trench? That was another question we had to investigate, at the same time as fetch samples from its bottom. That was why we had the echo-sounder on board. It was the first of its kind, specially made for us by Kelvin and Hughes, who make echo-sounders for merchant shipping vessels. It was designed to sound depths below 5,400 fathoms, which are depths that no merchant ship is interested in,

When the great earthquake that shook Japan in 1923 subsided, it was found that the sea bottom in the gulf off Yokohama had dropped 1300 feet. All along the fringe of the Pacific lie earthquake centres—off California, Chile, Japan, the East Indies and the Philippines. Seismographic measurements have shown with all the distinctness one could wish that most centres lie on the edge of the declivities that lead down to the great depths in the neighbourhood of the parts plagued by earthquakes. When these great natural catastrophes occur, changes can take place in the abysses of the sea: they can fill in, or they can become deeper still.

In our schooldays we were taught that the greatest depths of the oceans of the world were to be found off the coast of Japan. Our forefathers were taught that the greatest depth was five miles.

In 1912 the German survey vessel *Planet* sounded the deepest hole south of the Philippine Trench. The depth registered with a hand lead was 4,875 fathoms. The Germans returned in 1927 with the cruiser *Emden*, and this time with acoustic echo-sounding apparatus. Immediately south of 10 degrees North they found an even greater depth of 5,850 fathoms, and that depth was added to most school atlases and put into the geography books for schools. The "Emden Deep" stood uncontested for many years.

Several ships of other nations have since done survey work east of the Philippines, but none of them have been able to find that great deep. A Dutch expedition looked for it in *Snellius*, in 1930, but despite numerous soundings taken over the position given for the Emden Deep *Snellius* discovered nothing deeper than 5,476 and 5,509 fathoms. People began to grow sceptical about that tremendous deep. It is human to err. Had the *Emden's* scientists taken all the circumstances into consideration when they came to the final answer? Had an error crept into the calculations when making allowances for the water's temperature, salt-content and pressure? Had they made sufficient allowance for the delay in reaction of the man who wore the earphones with which they picked up the return of the echo to the ship from the bottom? To be out a mere fraction of a second would make a considerable difference in calculating the final figure.

In 1944 an American ship, *Cape Johnson*, sailed to that spot in the ocean to find out what was what, and she returned home with the surprising news that the

Emden Deep was not the deepest spot in the Philippine Trench. According to the *Cape Johnson's* soundings the Emden Deep was only 5,492 fathoms deep, but due north of it, on the other side of 10° North was a new deep, which later was called the Cape Johnson Deep. The depth was 5,686 fathoms—and so that was the depth of the biggest hole in the oceans of the world.

In 1945, *Cape Johnson* returned to take some final soundings and fix the position exactly, but the war with Japan was still on and a Japanese bomber came and disturbed her and the *Cape Johnson* had to retire.

Since 1945 no survey work of importance had been undertaken, and, as the *Cape Johnson's* results had only just recently been published, the world in general still believed in the tale of the Emden Deep. Part of what we were wanting to do was to use our echo-sounder to try and get further particulars of these great deeps and fix their positions. As it was we should need to keep the echo-sounder working continuously while we tried to find a bottom that in both extent and nature would be suitable for the long trawls which, along with our probings of the bottom, constituted our main task; so the one task fitted in well with the other.

34,125 feet or 35,100 feet, either figure was enough to make you dizzy. Take Mount Everest which is so high that only this year has it been climbed, and drop it into the Philippine Trench and ships passing over it would still have almost two kilometres of water between their keels and its top. At high water.

People are inclined nowadays to smile at Magellan, the first white man to sail the Pacific, when they

remember that he announced that he had found the deepest spot in all the seas, when he let 300 fathoms of lead-line run out without finding bottom. One's mind does not find it easy to comprehend that there are nearly seven miles between a ship's keel and the bottom of the sea across which she is sailing; but it is not quite as terrific as it sounds.

We are well accustomed to the idea that it's a small world—but take a look at a globe, a largish globe with a diameter of two feet or so; on such a globe the scratch that the Philippine Trench would make in its surface would scarcely be visible—in proportion to that diameter it would only be half a millimetre deep. That's all there is to it.

It was a collection of slow and thoughtful men who went back to their work after that lecture on the boatdeck. Small groups formed in the messes and elsewhere, and imaginations busied themselves with what we had been told.

Greve, Bruun and I stood up in the chart-house with the officer-of-the-watch following the steady working of the echo-sounder: 4,900 fathoms . . . 5,000 fathoms . . . 5,150 fathoms, which is 9,000 metres. We had arrived. Work could begin.

Our thoughts and our wishes sped across the moon-bridge up towards the teeming stars.

"Position 11°38 N. 126°11 E. Wind SO 1. Sea SO 1.

Continued sailing, and introductory sounding of the Philippine Deep was undertaken."

That is what *Galathea's* log had to say about that historic day when we reached the place which, if our plans went right, was to provide the climax of the expedition, in so far as you can be permitted to allow the sensational to enter into a scientific expedition.

For the next few days and nights the echo-sounder was the centre of attraction for the entire ship's company. Every twelfth second an instrument placed on its own down at the bottom of the ship sent a whistling note down towards the sea bed—a note just on the border of the supersonic, which means that it was just on the fringe of what the human ear can apprehend. On the other hand, there is no doubt about the creatures of the sea being able to apprehend it very well indeed. The moment the echo-sounder was started dolphins, flying fish and bonitos fled in horror from the ship, even those that had been following it faithfully and playing round it for several hours. When that note reached the sea bottom its echo was thrown back and the echo's arrival at the ship recorded by a sensitive microphone also placed down by the keel. The microphone transmitted the note through an amplifier which transformed it into an electric current up to the apparatus on the bridge, where the current acted on a pointer rotating on a disk. At its one end the pointer had a sort of pencil point that made a mark on a roll of paper slowly moving past the edge of the disk in unison with the revolutions of the pointer.

Each time the pointer passed it set a little brown dot on the paper. The time it took the echo to come from the bottom to the ship determined *where* the dot was

placed. Apart from the dots it was possible to read the depth off the scale marked on the disk. Then certain corrections had to be made according to a table which told you how much to add at a depth of so much to counterbalance the effect on the speed of sound of the salt content and temperature of the water and of the pressure at the bottom. Having done that, you had the exact depth of the sea at the spot where you were. The small dots formed a chain as you sailed along, a line that was an exact sketch of the profile of the sea bed.

Even at 5,400 fathoms the echo-sounder can trace the prettiest little picture of small protruding rocks, the wreck of a ship could be seen distinctly, but it is not quite correct to say, as Thygesen does, that you could use the echo-sounder to find a fountain pen you had dropped.

There were so many people watching the echo-sounder in the chart-house that on occasion the officer-of-the-watch was compelled to use force to get to the table when a new course had to be marked out on the chart. With breathless excitement we watched the pointer drawing its magic portrait.

Whenever there was an opportunity there would be two sextants pointing simultaneously at Venus, Aldebaran, the midday sun. Each position taken was marked on the chart, a special chart drawn to large scale for the purpose. It comprised parts of the grid where the world's greatest deep runs from NNW to SSE—a narrow trough parallel with the curving line of the Philippine Islands. It begins a little south of Luzon and continues until a good bit south of

Mindanao, and it is never farther from land but that the peaks of the mountains there can be put to valuable account in taking a bearing when the weather is clear.

It is not sufficient to know how much water you have under your keel. If you are to have any joy of survey work you must also know exactly where on the chart to mark in your soundings.

Three officers, two captains and one lieutenant, were kept hard at it attending to our navigation and fixing our position. There were constant changes to be made, of course, for we had to allow for wind and current and their effect on drift from the straight line which the compass and helmsman said we were sailing.

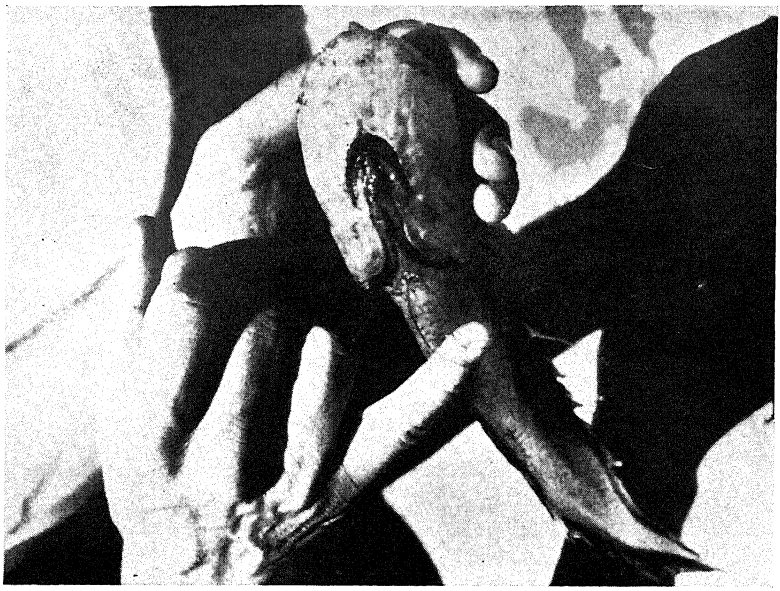
At the same time we had to keep one ear in the wireless operator's cabin listening to the weather reports from Manila, so as to know what weather was forecast for the next twenty-four hours. We were in a part of the globe where you cannot neglect to take the meteorologist's warnings seriously, for it is dangerously near one of the most notorious typhoon areas in the world and the bad season was drawing closer and closer every day. It would be no joke to be surprised by a typhoon in open sea with eight miles of steel wire out and heavy apparatus dragging across the sea bed astern. It would take at least four to five hours to pull that in—if we were lucky; and a typhoon can contrive a lot of dreadful things in less time than that.

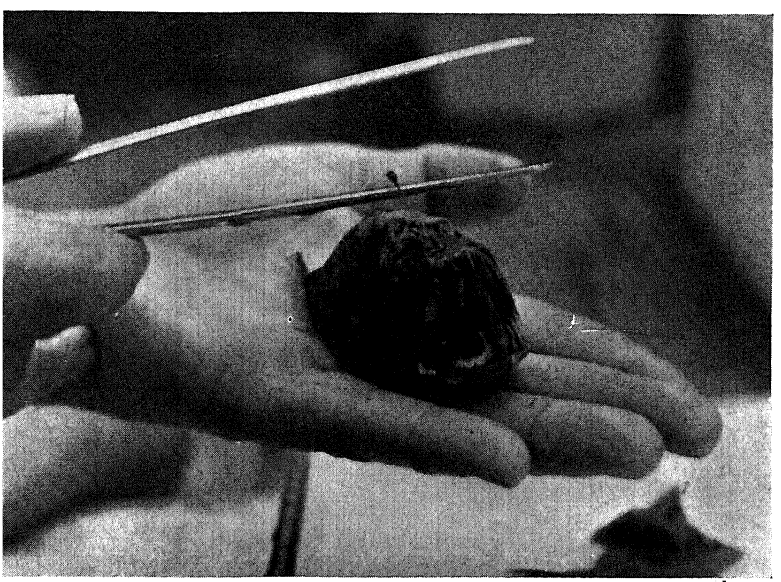
The soundings showed a level surface of fairly large extent around 5,150 fathoms. Not the greatest depth in the Philippine Trench, but good enough for a start. We needed as large a level expanse as it was possible to

get with the depth the same over a large area, for it takes hours to get apparatus to the bottom, and if the flat area at the bottom is only half or even a whole sea mile in extent, there is every probability that wind and current will have shifted the ship off the flat area before the apparatus reaches the bottom. If that happens, the apparatus will strike a steep slope: if it is a silt-sampler it will strike the slope at an angle and will either not be released at all or else wrongly, for it works like a coal-crane's grab and must close over a level surface. If it is a trawl you are working with, it can get askew and may even manage to knot itself, so that it does not fish. To say nothing of it being quite possible for it to be torn to shreds on outcrops on the steep mountain wall.

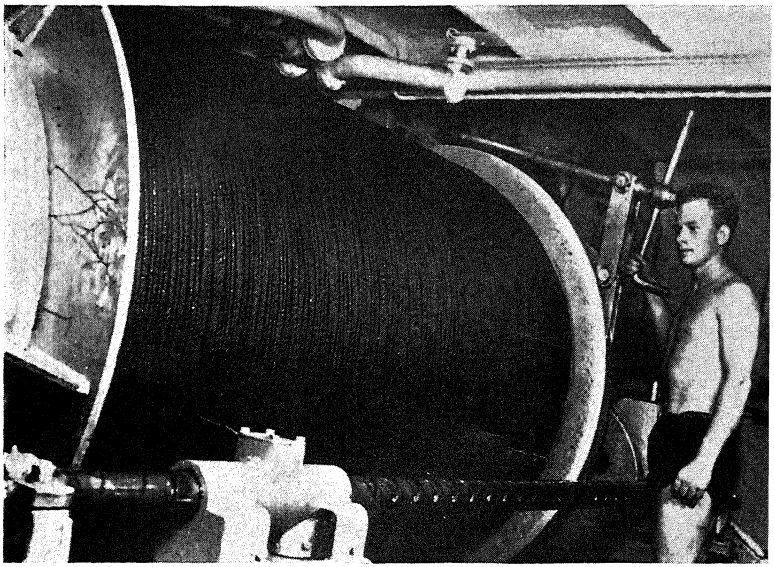
What we were looking for was a long broad valley, which would give us room to manoeuvre while the apparatus was being lowered, and a good even expanse to trawl at a couple of knots for two hours.

As usual, Dr. Bruun wished to start with a sample from the bottom so as to determine whether the sea-bed was hard or soft. If for that you use the coal-grab type of apparatus you get a sample of the bottom large enough to enable you to form an idea of the kind and numbers of animal life to be found per cubic metre at that spot in the sea. If you use the Kullenberg apparatus—a long, heavy steel pipe that goes deep into the bottom—you get a round plug about three feet in length and by analysing it you can form a picture of geological conditions, of the history of how that part of the sea-bed was formed, which a geologist can read layer by layer, as easily as though he were reading it in a book.

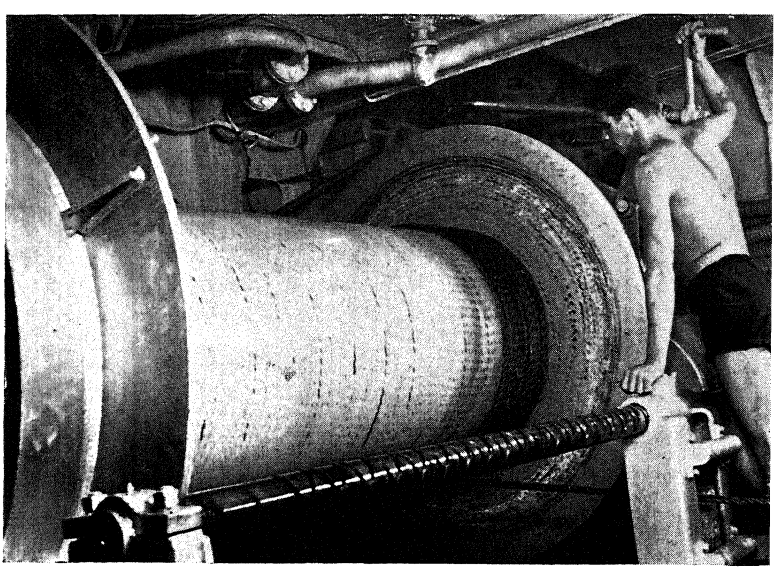




Two strange characters which had to be sent home before they could be properly studied and placed



The cable drum below deck looked like this at the start



and like this when the net had reached the bottom of the Philippine Deep

It was the C. G. Johs. Petersen apparatus we decided to use, the same that we had used some months previously off the African coast when we set up a world record for working with a silt-sampler. Now we wanted it to beat our own record with over twice the depth.

The motor of the great winch was started. The ship quivered. The report of "ready" came from the hold for'ard, where 12,000 metres of steel wire waited neatly coiled round a gigantic drum. "All clear" from the bridge. We were lying with wind and sea dead astern. Depth still 5,150 fathoms. The echo-sounder was recording a nice straight line.

"Ready at the big winch."

The grab was swung out, made fast to the wire on a ball-joint so that the apparatus would not twist the wire while it was being let down and hauled up. The man at the winch received the signal: "Pay her out slowly!"

The blue sea closed round the grab, which then became a patch of green dwindling and dwindling until it finally disappeared on its journey of 6 miles to the bottom, its jaw wide open and ready to close on a sea-bed from which no one had ever yet fetched anything up.

Our laboratory guests were in the stern with their instruments measuring the angle the wire made with the surface of the sea while the grab was being lowered. It had to go straight down. The telephone rang on the bridge:

"The wires' showing 4 degrees to port. Two degrees astern."

An order to the helmsman. A ring on the engine-room telegraph.

"All right now. The wire's dead straight."

"Stop engines. Wheel midships."

Telephone again:

"The wire has a tendency to incline in under the ship."

Another signal to the engine-room, where a sweating engineer turned handles and adjusted screws in a temperature of 53° C. People's clothes were sticking to their bodies, the sweat pouring down their faces and chests.

"Right as she is!"

Hour after hour it went on. There wasn't a moment in which to draw breath. Reliefs were sent to those in the stern, in the cable hold and on the bridge. Night fell. The usual inspection for fire and lights was carried out and the report made: "Nothing to report." Hammocks hung between the awning struts. Our two monkeys were sitting clasped tight in each other's embrace and had long since fallen asleep.

Our pet duck had stuck its head under its wing and become oblivious of its surroundings.

Still the wire slid across the deck; coming up from the cable-hold for'ard, being led across wheels that shone with oil, over the boat-deck, slipping down to the quarter-deck, four or five turns round the drum of the winch, and so at last to the great wheel of the "gibbet", from which it plunged vertically into the water. 195

feet a minute, with a stop now and then to change gear when the wire became heavier and thicker: 9 mm. thick it was at the one end and 22 mm. nearest the drum, and 39,000 feet of it, the longest wire in the world spun in one piece by Jacob Holm and Sons of Denmark. In water it weighed ten tons. Add to that the weight of the apparatus fastened to the end of it and of what that apparatus might come to contain. They spent weeks making their calculations before they began spinning that wire.

And about as much time had been spent on board *Galathea* working out formulae, using slide-rules and drawing curves on blue graph paper to find out what angle the wire should make with the surface, and how long it would be before a trawl had got right down and was drawing evenly along the bottom a couple of kilometres or so astern of the ship and ten kilometres down. Poul Andreasen and Ingolf Crossland had taken possession of a table in the saloon for several weeks and conversed in a mathematical dialect that to the uninitiated was as incomprehensible as Malayan. Now we would see whether thay had been right, for theory is one thing and practice can be another.

"Steady as she is. Half speed starboard engine. Course 78."

The winch purred like a cat. Everything was going as calculated. It was moonlight and a dead calm. The metre-counter on the winch ticked away without interruption, the figures coming up three metres at a time. In the cable-hold below the great drum was beginning to look horribly thin.

9,000 metres out. 9,100 . . .

Bottom!!

That's a thing you must just accept. You cannot feel the slack on a fishing line over that distance. The wire was showing a fairly strong inclination to port.

Haul in . . .

It took three nerve-wracking hours. Bruun and Greve left the echo-sounder and came to watch mile after mile being wound back onto the great drum. The weather looked as though it were going to be fine.

Only two miles left. Now only one. Five hundred yards. Five hundred feet.

"Slowly . . ."

A little white bag appeared, fastened to the wire with yarn. That was Professor ZoBell's little experiment. He had fastened twelve sailcloth bags, each containing a small glass ball, to the wire at intervals of two metres. The thickness of the glass varied between 3 and 6 mm., otherwise they were like the glass balls fisherman use to support their nets.

The first bag was cut off and handed to ZoBell, who, with triumph in his voice announced that the ball was intact. Intact after being subjected to the appalling pressure of a column of water over 29,000 feet high. The next bag looked odd. There was a large hole in it. The ball had vanished. It had exploded with such force that there was no trace of splintered glass to be found anywhere in the canvas. The canvas was of the heaviest quality, and the hole in the side of the bag was 6-7 centimetres across and the edges all frayed. Next

ball: intact. Fourth ball: the same. Fifth ball: half full of water, but no sign of injury to be seen. The water presumably had been forced in through the microscopic pores of the glass. That sounded incredible—but there we had the proof in our hands. The sixth and seventh bags looked as though the balls were still inside, but as though in some mysterious way they had grown smaller. The bags were opened and the mystery explained. The balls had collapsed inwards. The pressure had been so violent that the glass wall had been literally pulverized. The individual greenish crystals had been crushed together like a snowball. If you rubbed it between your fingers you could feel the glass dust as fine as flour, the separate grains not even large enough to cut or penetrate the skin.

We looked at each other, and a shiver ran down our backs as we thought of the pressure needed to do things like that. Then we forgot to look and see what had happened to the rest of the balls which ZoBell cut from the wire without spectators, for now our eyes were fixed on an object that in the light of the searchlight was shining a whitey-green through the water.

The grab had closed, but either the bottom must have been too hard at that spot or, despite all our care, the apparatus had struck the slope somewhere, for it was not filled with sea-bed from 9,100 metres down. It did contain something though, a little over 125 centimetres of coarse greenish sand. Well, that was just the beginning. Better luck next time. We had expected difficulties here, where we had nothing to go on, and it might well have been worse.

The sun rose, but no one had time to watch it.

The hydrographic winch on the port side midships was already beginning to unwind its thin wire over the side, a steel wire to which were fastened a series of water-samplers fitted with thermometers, which would not only fetch samples of water from the various depths to be analysed for salt- and oxygen-content, but also take the temperature of the water in the layer from which each sample was taken. The water-samplers were so artfully made that they closed and turned upside down the moment they were struck by a metal drop-weight, called a messenger, that came down the wire. At the same moment as the sampler closed and tipped, the thermometer also turned upside down which stopped it registering, so that it continued to record the temperature it was measuring at the instant when the apparatus went bottom up.

When the uppermost sampler had been struck by the drop-weight and turned turtle, in doing so it released a similar messenger which continued downwards until it struck the next sampler in the series—and so the process was repeated until the last sampler was closed and the last thermometer inverted, when the order was: haul in!

The hydrographic station, *Galathea's* scientific station No. 412, went according to plan. First, a series of five samples was taken from depths of 100, 150, 200, 300, 400, and 500 metres. That worked perfectly. Then another series was taken at depths between 3,500 and 6,000 metres. We had worked at those depths

before, and all went well. Then the wire was payed out in earnest on its way to the bottom.

The bridge reported a depth of 9,200 metres. The instruments disappeared downwards one after the other, pioneers on their way into unknown territory.

The gauge registered 9,150 metres. Stop. We did not want those sensitive instruments to strike the bottom. The messenger was sent off on its way. A hand held the wire to feel if the blow it struck down there was perceptible. After half an hour a very faint quiver was felt, which could have meant that the first of the instruments had been released at a depth of 7,150 metres. But one could not be certain any longer; the distance was too great.

One hour after despatching the first messenger you could be fairly certain that the lowest of the containers would have been struck and tipped, if the whole series had worked as it should.

"Well, haul in . . .!"

The wire wound back on to the drum, while someone stood by the brake in case anything unforeseen should happen. The motor hummed. Water dripped from the wire which was as taut as a piano wire.

"First container visible—slowly now—on the surface—stop!"

Nothing wrong. It had tipped as was expected of it. All quite normal.

Second container visible. It too was intact. Inside it was water from a depth of 8,550 metres, ready to be examined chemically in the laboratory. The ther-

mometer had registered that the temperature of the water down there was 2.22° Centigrade. It was 29° Centigrade on the surface. That, too, was expected. Third container. It was not so good. It had got its sample of water as it should, true enough, but the thermometers had exploded with such force that they had broken the solid metal frame in which they were fixed. The metal was quite frayed at the spot where the explosion had taken place. A dynamite cartridge could not have done it better.

The last container had no thermometer frame at all. It looked as though the whole thing had been blown away. One tiny crack in the thermometer could have caused the explosion, a mere superficial scratch on the surface.

That at any rate was better. The silt-sampler's semi-fiasco had been made good by the three-quarter success of the hydrographic station.

In the laboratory they were already busied with mysterious fluids and bent glass tubes; Bunsen burners flared and flasks bubbled. We had samples of the water and many of the temperatures from 29 different depths at that point in the ocean. That ought to be able to tell us something about living conditions down there.

The next experiment was already being started. This time it was being made with the hydrographic winch and its thin 4 mm. wire, and the Kullenberg apparatus, that slender hollow cylinder with a heavy head, had been chosen to get us a sample of the bottom. Down it went as fast as the wire would come off the drum. It needed to get up speed, especially towards the

end, so that it would penetrate right into the stuff on the bottom and cut a faultless plug through the ages.

The bridge now reported a depth of 10,328 metres. Excitement increased. This was a new world's record again. If only it would be successful.

"Well now we'll haul her in!"

The gauge began counting backwards, and Kläning was already in his place in the iron cage that hung out over the side. A swarm of the inquisitive clustered round the winch, where there really wasn't room for those without business there. Right in the forefront stood Professor ZoBell in swimming trunks and nothing else. This was where *he* was to have his chance. He would be able to take a sample of that virgin mud that had never been exposed to contamination with the bacteria of the surface. That sample he could submit to an artificial pressure corresponding to the 1,000 atmospheres from which it was taken, and so examine it and see whether he could find bacteria there, and if so keep them alive and get them to propagate.

That is, if there *were to be* mud in the apparatus, and if bacteria could live at those depths . . . if and if and if . . .

"Apparatus visible" . . . "On the surface" . . . "Stop."

It *had* been successful. The invention of our Swedish comrade, Börje Kullenberg, had cut into the sea bottom ten kilometres below the surface as though it had been butter, and the cylinder contained a plug of the finest, soft deep-sea mud, 75 centimetres long. ZoBell got his

samples: from the bottom, the middle and the top. He sterilized his instruments and set particles of mud on culture mediums down in his cabin, where he had set up a field laboratory under pretty primitive conditions. Small test-tubes with long rubber corks were put into a pressure chamber and the pressure increased up to 1,000 atmospheres.

On deck, they were already getting ready for the next attempt to fetch more samples from the bottom, this time using the Petersen grab. While it was being wound in a coil burned out in the winch because of damp. The apparatus was saved, and we turned the ship's bows towards land so that we might go into a little bay there and in peace investigate if we could repair the damage ourselves. It would be a catastrophe if we couldn't.

The good weather should and must be made use of. That it should have happened now, just when we had got going!

As the anchor dropped in little Tubajon Bay just out from the village of San Vicente on the island of Dinagat, only five hours sail from our place of work, ZoBell appeared on deck, his face beaming. There *were* bacteria in the bottom mud. They were alive. They were multiplying.

Galathea had provided proof that life can exist under pressure of 1,000 atmospheres, and Denmark was the first country to plumb the bottom of the deepest chasm in the seas and oceans of the world.

The morse-key began to tap: "*Galathea* calling Manila—*Galathea* calling Manila . . ."

The next day we were front-page news in the big newspapers of the world.

CHAPTER VII.

TUBAJON Bay is a funnel, the pointed end of which is aimed at two villages, Santa Cruz and San Vicente, that are separated from each other by a broad mangrove swamp and the mouth of a little river. A couple of rotten tree trunks lie across it, bridging the stream. Behind the swamp rise the mountains, green with rain forest from foot to peak.

A coral reef fringes the bay, and it is only up at the point of its funnel that there is an even sandy bottom which continues up to the shore, where stand the houses. There were only fifty or so of them altogether, thatched and set on piles out of regard to the tides, snakes and sanitation. The two villages are inhabited by a tribe of those happy people who own no shirts and whom the Lord likes because they harvest without worrying very much about the sowing. It is seldom anybody takes the trouble to disturb their peace.

The starboard anchor went rattling down into 20 fathoms. The sun was just on the point of setting. Our guests were standing by the rail looking at the pile-villages.

"Magellan was killed by savages just across on the other side of Leyte, which you can see over there," said Grüner, whose preparatory reading for the Philippines had been extensive.

"I read in *Thirty Years among Savages*," said Gerhard, "that the cannibals . . ."

"That wasn't here!" interrupted Ulrich.

"Yes, but all the same," said Gerhard.

It was uncanny. There wasn't a light or a sign of life in either of the villages. There wasn't a war canoe, nor any other canoe, to be seen anywhere in the bay or along the reef.

The sun went down and a full moon rose up from behind the mountain in the shadow of which the villages were hidden. Our scientists prepared for a little fishing by artificial light.

The fierce light was directed at the surface of the water which at once began to swarm with small fry hotly pursued by eager little cuttlefish. Three bells were sounded up on the bridge.

"Canoe to port!" sang out a voice from the boat-deck.

Our eyes probed the darkness. Slowly a small outrigger canoe slipped into the circle of light from the fishing lamp. In it sat one man wearing a large plaited straw hat and a patched white jacket over his brown torso. He looked anxiously up at the row of white faces bent towards him:

"You good friends?" he asked. "You no Japs?"

He had been sent by the headman of the village to reconnoitre. With his heart in his mouth he had paddled out, one man against a man-of-war, carrying out his orders in the interests of the community. Now he sat

there, small and fearful in his stone-age craft gazing up at all our faces and hoping for a comforting reply.

How many heroes aren't there whose names never get into the papers! The last time that man had seen a ship anything like *Galathea* was in those years when the little yellow Asiatics were swarming over the Philippines carrying fire and the sword, and with guns ready to raze such villages as his to the ground. Those were the days when the Danish consul in Manila with his own eyes saw a Japanese soldier marching the streets of the city with a brown baby spitted on his bayonet. Our guests did not think of that. They were amused by his nervousness, thought him no more than an inquisitive old man, said "friends" and "Denmark", called him "old boy", fetched packets of cigarettes and small bars of chocolate which they lobbed into the canoe, and meanwhile our two Philippine guests from the Fisheries Society in Manila tried to explain to him who we were and why we had come to his bay.

He did not understand much, for there are nearly a hundred different languages in the Philippines and our scientists spoke Tagalog which was not known down there. However, they said "mabuhay" which is a sort of esperanto word used everywhere in the islands with meanings ranging from "pleased to meet you" to "o.k." and "goodbye", so after a couple of *mabuhays* on both sides everything was as plain as a pikestaff.

"They are good Christians there in the village," explained one of the Fisheries men, "and they say that it will be perfectly all right to go ashore. They are looking forward to seeing us tomorrow."

After the war the Igorots in the north of Luzon used to set the sun-dried heads of Japanese up on poles and put these along the jungle paths to act as signposts to the headhunters' villages. They never went to those lengths in San Vicente, but the next day we did see how they put Japanese steel helmets to domestic use, making them serve as basins and casseroles and flower-pots, while they fetched their water from the spring either in three-foot lengths of thick bamboo or in Japanese aluminium shell cases.

They must have been good people, because they liked flowers. Though the entire island was a tropical paradise where flowers covered the ground in profusion and dangled from the bushes, the villagers had gone to the trouble of planting hedges of croton bushes with their parti-coloured leaves round the houses, and from the shutters of cunningly-woven palm leaf with which they can close the glassless windows of their huts, hung pots of red geraniums looking very pretty and homely.

Underneath the huts snored little black pigs, which only grunted when the impertinent chickens tried to peck lice and scurf from between their coarse bristles.

A boat went ashore crammed to the verge of sinking. It ran up the white coral sand and emptied its load of humanity in front of the huts, whereupon small naked kids screeched with bewilderment and excitement and scattered in all directions in search of Mummy.

White and brown inspected each other. It was not long, however, before contact was established.

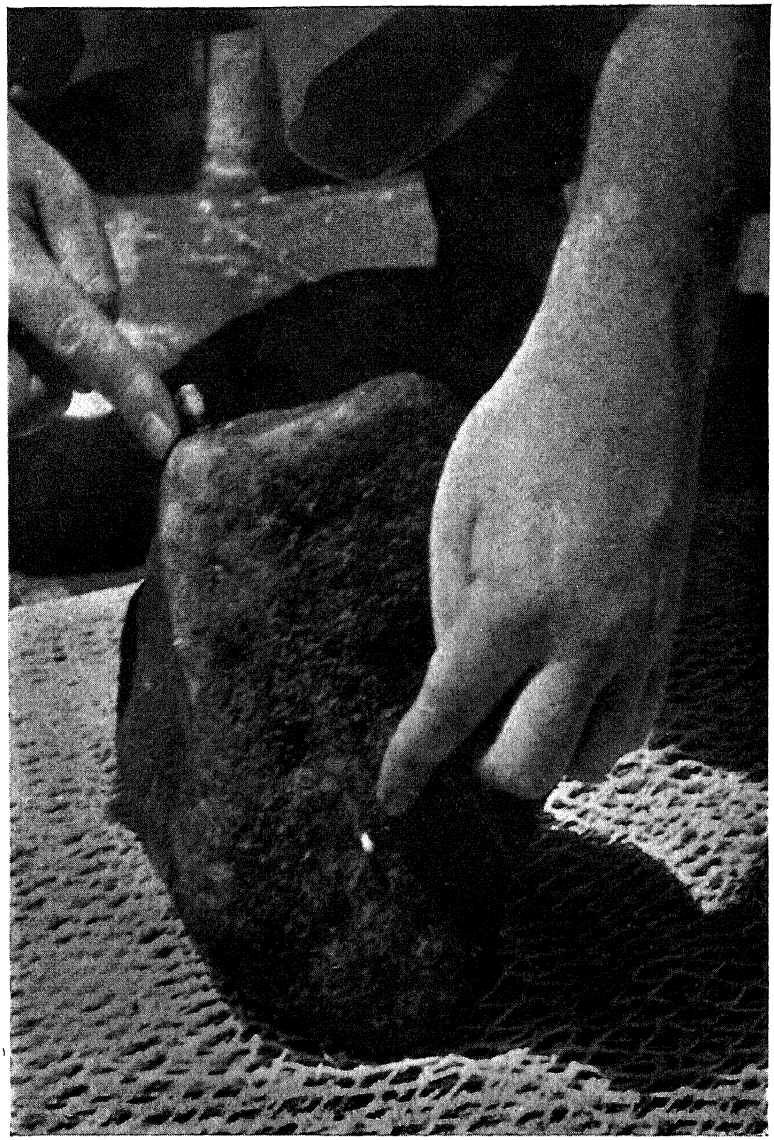
Pearl-tooth was one of the landing party, and all defences fall when he exerts himself. He had fostered a

strange black full beard that grew as sparsely as rye straw in heathland. He did cartwheels down the main street, and then suddenly there he was thirty feet up in a palm tree pretending to be on the point of falling. Then he slid down and began walking with his knuckles on the ground like a monkey, then he stood erect and made himself squint at the same time as he shoved his top plate forward with his tongue and made his false teeth protrude a good inch, and ran his fingers through his hair and gabbled Finnish. It was the first time there had been a circus in San Vicente. He could have set up as medicine man there and had a huge practice straightaway.

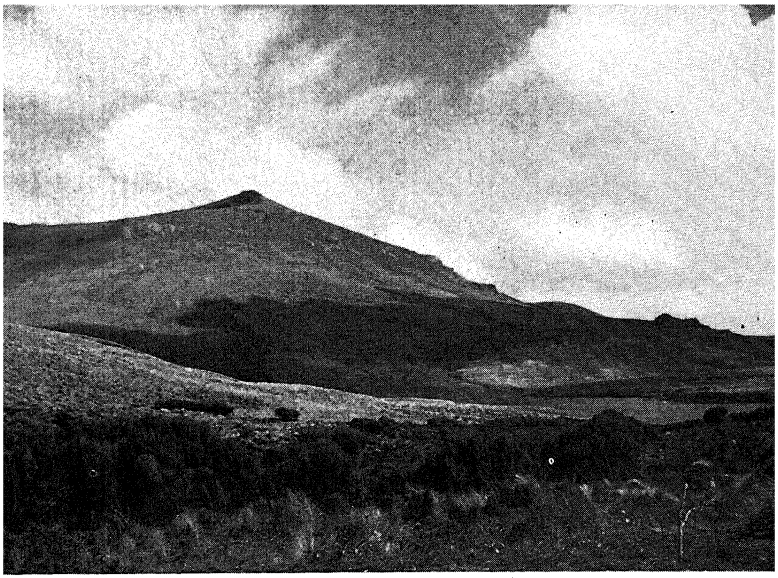
From that moment the village was *Galathea's*. The children emerged from behind their mothers, who began baking coconut cakes which they offered to all and sundry. Whoever had a calabash or an earthenware jug of rust-red palm wine produced it and treated the visitors. One old man came and held out a lovely conch; he was given a cigarette worth a halfpenny and the shell changed owners.

The mayor appeared and showed us round his village, took us to the church, the largest house there, with touching altar paintings, a pair of large mussel shells that acted as fonts and hatcheries for malarial mosquitoes, and pews consisting of two lengths of bamboo tied together with coconut fibre. A couple of hens had perched on the chancel rail, and the faded, termite-eaten altar cloth looked as though it had been a long time there.

The church's two bells were hung outside. One was



The little grey stone with the two insignificant-looking sea anemones which caused such a sensation throughout the world, proving the presence of life at the tremendous depths of the Philippine Deep



Campbell Island where *Galathea* got her sea-elephants, the most northerly of the islands of the Antarctic

Sea-elephants from Campbell Island photographed at close quarters

an old cracked ship's bell cast in Leith; the other an oxygen cylinder rufous red with rust.

The bigger children came back from school: hair done, best clothes, books under their arms. Pearl-tooth's admiring public was growing. Leicas and box cameras were clicking up and down the street.

One of the children let me look at his geography book. It devoted about a dozen pages to Europe. There was no mention of Denmark, Norway or Sweden; but on the other hand three whole pages were devoted to Switzerland. If it was the Swiss tourist organization that gave money to have that book printed, it wasn't a good investment. The children's voices quavered with horror when they spoke of the snow and ice in the pictures. If it was a Swiss missionary who wrote the book, there can be no doubt of his patriotism. The children wouldn't sell their books. Otherwise, I would have bought one of those geography books and sent it home to show our people how that sort of thing ought to be done.

Orchids were growing on innumerable dead palm trunks along the street and in between the houses. They dangled from flower pots and billowed out of half coconuts. San Vicente is famous for its orchids. Every now and again a smart business man comes from Manila and buys the whole crop for 3 pesos apiece. The next day they can be bought in Manila for 7 pesos.

I walked up to the churchyard, which lay on a slope above the town, a little patch of green with primitive crosses of sticks tied together with string and rope: no names, no dates. Scattered among the crosses were

shiny freshly dug-up skulls, a whole collection of which was piled up under cover of an open shed. In the middle of it all lay an open coffin with the skeleton of a child. Sacrificial foods had been placed on the fresh graves, biscuits softened in the rain, mangoes, the flesh of which was rotting, a piece of roast chicken, a bottle of wine stuck into the ground neck first.

Of course they're good Christians—but the old heathen ways do still receive an occasional thought.

Galathea's big game hunters set off into the jungle, breasting the thick undergrowth and defying the lurking dangers of the tropics to get us fresh provisions. The natives had asserted that there were both wild pig and deer all over the island.

The hunters were away all day. We listened in vain for the sound of shots and were almost becoming anxious that they might have strayed beyond ear-shot. However, our sceptical cook had previous experience of these hunting expeditions which had made him spend hours reading up the best way to prepare wild boar, antelope, giraffe or elephant's trunk all for nothing, and he just shook his head as he had done that morning when the expedition set out with its packets of sandwiches, thermos flasks, native bearers to carry the bag, and an arsenal of guns of varying calibre. And he was right. The expedition took the same course as all the others, returning empty-handed in two parts. The first party had given up after a very short while and had decided that it preferred lying on its back on the grass; but the other had defied all danger, surmounted dizzy mountain peaks and plunged into abysmal valleys where raging

torrents had to be forded. They had embraced huge trees whose bark was stuck with thorns like four-inch nails. They had been all but strangled by lianas and their skins were riddled with the holes of the mites that had fallen from trees and burrowed in before anyone could stop them. But they had not met any game. Their guns, in fact, had been a horrible nuisance.

There had been just the one moment when they had believed that Diana or St. Hubert, or whoever it is that smiles on such occasions, had deigned to notice them, and that was when they saw a grey water-buffalo standing guzzling grass in a clearing in the forest. They had formed a line and slowly crawled forward. It was one by the name of Buch who had the honour of first discovering that the buffalo was tethered to a palm tree and belonged to a little hut on the fringe of the clearing.

Both parties had exactly the same bag, but unfortunately it was the party that gave up which had been carrying the sandwiches and thermos flasks. We had to disarm the hunters before the two met.

Other expeditions were sent to the coral reef along the coast. Strictly speaking these were scientific, but when our tank for underwater photography was put out and towed to the reef, there was great demand for seats in the motorboat from those wanting to experience the wonders of a coral reef when you can see it in all its colourful beauty through the four plate-glass windows of the tank. Native fishermen came in their canoes to help us, brown bodies dived into 25 feet of water and speared cuttlefish right in front of the eyes of the

spectators in the tank. We had to put two in at a time to keep pace with the demand.

Our stay in Tubajon Bay was *Galathea's* break and it lasted for two days, by which time the fault in the winch had been found and repaired, and the winch itself would once more purr as it revolved at full speed. It had taken a lot of very hard labour, but that had saved us precious time and the weather was still good out by the Philippine Trench.

There was a complete ring of outrigger canoes round the ship as we weighed anchor. We had given that village a topic of conversation to last for many years. Perhaps it would be generations before the visit of that lovely ship from a distant country would be forgotten. We hung over the stern and waved to the canoes as long as we could see them. The huts of San Vicente became smaller and smaller. Then we rounded the point and stood out to sea.

Our spirits were high. The first act had exceeded our expectations. ZoBell's bacteria were flourishing and living the happiest of family lives in their test-tubes. The press agencies were asking for news.

I went into the wireless room and we contacted Manila Radio.

"Stand by for more news . . . !"

* * * * *

The trawl had been out for two hours on the entire 12,000 metres of wire. It was the three-metre sledge-trawl we were using, our favourite one for occasions when things looked a little risky and the bottom was a

little doubtful. A sledge-trawl is robust; the net is stretched on a quadrilateral iron frame with rounded corners. It can run like a sledge across an uneven floor and take a lot of bumps without going to pieces. For more delicate work we had TOT, HOT and SOT: triangular otter trawl, herring otter trawl and shrimp otter trawl.

There was every reason to assume that things were a little risky and the bottom doubtful. That Dr. Bruun had decided on the three-metre trawl was in itself a hazard. We could have started our fishing at a depth of ten kilometres with one of the two smaller versions of the same trawl that we carried. These had mouths of one and two metres. Not content with choosing the largest of the three trawls, we had fastened a bag to one runner and a triangular bottom-scraper to the other, so that we were pulling three instruments on the one wire.

It was pitch dark, but no one seemed to want to go to bed. On the bridge they watched the echo-sounder with tense attention. Down there the steel wire was pulling our instruments along or so we hoped, not too gently, not too hard, but just right. So we hoped.

The echo-sounder was working perfectly. The bottom was as flat as the floor of a room, and if the samples meant anything, then the trawl was being hauled across the soft mud of a comparatively broad plain down the length of the Philippine Trench. Naturally we were optimistic. So was Columbus, even in those last few days before land appeared out of the sea in the west.

The wire made the correct angle with the surface. The sea was calm. There was no breeze. It was really hot. The thermometer on the bulkhead in my cabin registered 38° C., but heat was a trifle that we did not think about.

The echo-sounder was revealing a slight tendency to rise in the sea-floor. The trawl had been drawn across a level depth of 10,460 metres—varying with a few metres either way. This was 10°16N. and 126°42E. The wind was strength 1, east. The sea from the same direction, strength 1. The surface temperature of the water was 31° . . .

The wire had been kept at the same angle throughout the night, and how difficult that was when the speed was only a couple of knots and the ability to steer the ship so reduced, anybody with any knowledge of the sea will realize. In its own way it was a feat of navigation.

We had been afraid that the long wire might break during the experiment. After all, the careful calculations on which we were relying were only figures on paper and mistakes can be made. But after a while we stopped thinking about the breaking point of the wire and began to wonder whether our nerves would stand the strain.

"Well, let's start winding in."

Bruun rang the order to the bridge, to the cable-hold and to the echo-sounder in the chart-house.

The man at the controls pressed a button and turned a wheel. Slowly the great heavy winch began turning, then faster and faster until it was doing its maximum revolutions. Our faces were stiff with excitement.

Ten tons of wire and at the end of it three instruments which were perhaps filled to bursting with clay—that was a heavy burden to haul in. The winch had failed us once. If it did so again, how were we to get in eight miles of wire?

However, our fears were groundless. The winch hummed away and its motor shook the whole of the quarter-deck, but who cared about that—who wanted to sleep anyway?

Mile after mile of wire slid in over the great wheel in the "gibbet" aft, steadily and sedately. But 12,000 metres is a tremendous length. The night wore on, the winch only stopping when it was necessary to change gear. At four o'clock in the morning the man at the winch reported that only 500 metres remained out. We breathed a sigh of relief. Never mind if it was a frost. We had been to the bottom with the water-sampler, with Petersen's grab and with Kullenberg's sounder at depths where no one had been before. Professor ZoBell had demonstrated the existence of bacteria in mud from the deepest layer. So there was life. That was one of the things we had wished to find out. We told each other that we could afford a failure, said that it was out of the question to expect success with one's first trawl at a depth like that. We almost convinced ourselves that the natural thing to expect was a few tatters of net on the iron frame at the end of the wire when it came into sight shortly.

We stood in a huddle in the stern, almost cutting ourselves on the sharp edge of the gunwale, our heads stretched down towards the dark water in which the

reflection of the arclights shot like lightning. Buch had taken up his place at the great wheel, and his assistants stood ready to execute the maneouvres that by now had become pure routine.

Then there was a roar: "In sight!"

Ghost-like a gleaming patch came slowly creeping up towards us out from the deep-blue water.

"The trawl's there."

"There's the bag!"

"The scraper's gone, though."

"No, there it is, out to starboard."

They were whole. They were empty. They had not been down at the bottom at all. Wait a bit—it was too early to say anything. Thirty feet yet. There's mud on the wire! Nonsense—it's oil. Oh, shut up . . .

Three feet. It was like looking at the three objects through a shop-window. Now the horns of the sledge-trawl had broken the surface and were causing each a little foaming wake.

The apparatus was intact. They had trawled the bottom. They were full of mud. There was no apparent sign of life. In their journey trawl and scraper had picked up some large stones, the largest the size of a child's head. One of our laboratory guests lifted the largest stone and turned it over.

"What's this knob?" he asked, pointing at a greyish-white wart, a soft growth on the stone.

"A sea anemone," replied Bruun, and he managed to say it as undramatically as if he had been referring to

a stone from a depth of 500 metres. There was not one of us who let himself be taken in by Bruun's tone. We all experienced that same indescribable sensation of joy, the same jubilation after the night's racking wait, that Bruun himself felt.

It was Sunday morning, 22nd July, 1951. Bruun and I shook hands.

"Coffee will be in my cabin this morning," said Greve.

The sun rose, one of the most magnificent dawns we had witnessed on the expedition. The air was clear and pure, the colours glowed in the east behind a couple of gold-rimmed cumulus clouds. Leaning against one of the davits, ZoBell stood gazing at the belt of the Dawn, quite lost in the beauties of the Nature whose secrets he had been trying to plumb all his life. The hint his bacteria had given has now been proved fact: it was possible for organic life to exist at a depth of 10,450 metres and under a pressure so dreadful that it splits solid metal cases into fragments and squashes glass balls to crystalized lumps. A pressure so tremendous that the water itself changes character,: such disorder is introduced among its molecules that its boiling point lies 50 per cent above that of surface water. That, however, has little practical significance: not many people will want or have the opportunity of cooking potatoes in salt water that has been subjected to a pressure of 1,000 atmospheres.

The coffee we had been promised was served from a bottle with a red neck and it bubbled deliciously against one's gums.

The telephone rang. It was the bridge asking what was to be done next.

"Same apparatus out at once. We'll trawl again."

And we did.

Down in the laboratory they were busy examining the stone and the mud that had been brought up. There were *two* sea anemones on the big stone. There were 15 others hidden in the mud. Some tiny threads proved to be diminutive sea-slugs: there were 61 of those. The rest of the catch consisted of four bivalves and one sand-skipper—plus one deep-sea fish that had jumped on to the trawl on the way up and which on this occasion left us quite unmoved. There was no doubt about the other creatures: they were from the bottom. You wouldn't be likely to find a stone the size of a child's head suspended free in the water with two sea-anemones as passengers.

There was junketing on board *Galathea* that day and evening. Punch was served to everybody on deck. Our foreign guests said nice things about Denmark and Danish initiative. We cheered three times in Swedish, three times in American and three times in Philippine. We were dead tired and so sleepy that we could scarcely keep our eyes open, and when we did go to our bunks it was with the happy knowledge that *Galathea's* name was now chiselled on the tablets where Bruun's master, Professor Johannes Schmidt, had set that of *Dana*, and where it would have the company of the other famous names that had contributed to our knowledge of oceanography since the days of *Challenger*.

A message came from *Life*: might they send a photographer aboard? He could come in a seaplane which would land alongside. Let them wait till the morning. We only wanted to sleep; which we did, falling asleep to the comfortable purring of the winch. Those 12,000 metres of wire were going out again for another trawl.

The next morning gave us another successful trawl that produced eight sea anemones, more sea-slugs, one crustacean and a couple of bivalves. Thus it looked as though there were food enough there at the bottom for fish as long as they weren't too pernickety, only none of them had gone into the net. From our experience of deep-sea fish from 5,000-6,000 metres they were not likely to be very spry. They wouldn't go out of their way to sniff at a trawl, nor, on the other hand, would they make any attempt to swim out of it if they had had the misfortune to get inside. If there are fish at that depth—a thing future expeditions will have to determine—they cannot be very numerous. There must be limits to the manna that will fall down to them from above. They must be more or less restricted to sea anemones, sea-slugs and bivalves.

One might imagine that there would be plankton and fish-spawn dropping down to the bottom there from the upper layers, but there is no more of that than the roaming toad-fish and other kinds of pelagic creatures of obscurity can gulp on the way.

Seldom had we seen a sea so dead as that covering the mysteries of the Philippine Trench. It was of that

magnificent blue colour which tells that the water is as barren as a desert. We saw no frolicsome dolphins, not a single shark nor one sea bird in the month we spent there—and that despite the fact that it is no more than fifty sea miles from 7,000 islands where there are nesting places for birds galore.

And then the good weather came to an end, and Louise appeared on the scene.

Typhoons have feminine names in the storm warnings of the meteorological institutes. Louise was an exceptionally well developed woman with flying skirts. She was moving at a pace of 10-12 sea miles an hour along a course that would take her from the spot west of the Carolines where she was born, straight across northern Luzon. She was being followed by men in aeroplanes trying to find out what were her intentions.

She was blowing with a speed of 130 knots at the centre and 250 miles from that centre the speed of the wind was still 50 knots. That was more than sufficient for ships finding themselves within that 250 mile circle, as we did, to get up steam and hurry off so as to avoid meeting the beauty.

Waves began rolling in from the north-east. Big, black clouds came up and expunged Rigi, Aldebaran, Venus and Polaris, so that we could take no more sights. Lightning leaped dazzlingly from cloud to cloud. It was useless to think of working with either trawl or silt-sampler. We crept into the lee of Bocas Grande and only put out to sea again when the wireless reported that the coast was clear, which was when Louise had passed

the north point of Luzon and was on her way towards Hongkong.

No sooner, however, had we got our apparatus into the water and 12,000 metres of wire out, than our friend in the wireless station at Manila began chattering about a depression that was coming from the east—this time with course straight for us. The depression wasn't yet so active as to have been given a girl's name, but it might become so any moment—typhoons are capricious. We wound in again and steamed off southward to tackle the southern part of the Trench.

The weather was a bit unsettled, but we lay there and took silt-samples, fetched up water and collected bacteria for ZoBell. We also tried the trawl, but it was as though our luck had deserted us with the disquiet in the air. The water-samplers did not tip. For one reason or another the messengers hadn't struck the first sampler with sufficient force to release the next drop-weight on its journey down. A jelly-fish had got on to the wire and its fringe had acted as a sort of brake. It doesn't take much. Up again. Out again. This time the wire came up with the thermometers crushed to atoms. So great had been the force that splinters from one of the thermometers had been shot into the metal case surrounding it and were not to be got out again.

Unexpected things happen at a depth of 10,000 metres.

Who can say how compressed the molecules are under such pressure? Who knows the viscosity of the water? It is not sufficient to measure that in a bucket of water that has been fetched up and freed into the

pressure of the surface; you must know how things are at the spot where it has been under pressure perhaps for millions of years.

Is it "heavy" water? One thing pointed to that. We had to fasten two messengers together in order to get the lowest water-samplers tipped. A couple of days later when we tried the non-magnetic sphere which one day we were going to fill with apparatus capable of registering the effects of the earth's magnetism in the great depths, we sent it down fitted with a metal vane 3-4 metres long and about 50 centimetres wide, the purpose of which was to prevent the sphere from rotating while being lowered and raised. That vane came up with one end completely bent and the other end broken off. The sphere was down at 10,000 metres. As it was not to have any instruments in it on that trip and we had felt it a pity that it should go down empty, we had put a couple of bottles of beer inside to get them chilled easily and cheaply. Both sphere and the beer came up intact. Only a tiny amount of water had seeped into the bottom of the sphere. It had stood its test. But the vane looked as though a giant had been playing with it. The measuring apparatus in the sphere showed that it had not rotated at any particular speed down there. So how had the vane broken?

Some people hazarded the guess that a gigantic cuttlefish might have done it. It is probable that the true explanation will prove even more improbable, when one day future expeditions take the question up.

We zigzagged backwards and forwards, up and down, across the Trench. The echo-sounder drew the

one silhouette of the chasm after the other. The winches rotated, but we were to make no more sensational discoveries. The trawl came up after two hours trawling and eight hours lowering and raising entirely enveloped in 600 metres of steel wire. Twice that happened and it took an appalling time to get it all unravelled. But two bags that had been fixed to the sledge-trawl had done their job and brought us up new creatures and fresh bacteria for ZoBell.

From stem to stern the ship was a hive of activity, but luck was not with us. We came up against difficulties of which we had never dreamed. They were all of a technical nature: it was bad enough trying to find a suitable place to trawl on a bed that was never more than ½-1 sea-mile in breadth. Before the net had got down the ship had drifted in over the slope where the depth was 2,000 metres less. It was work that called for the closest co-operation between the fishers, scientists, navigators on the bridge and the goddess of luck.

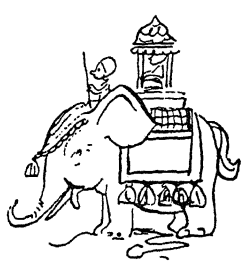
Then came the time when we had to leave. We had spent a month at the Philippine Trench and we could not afford more. In that time we had successfully obtained samples of the bottom with two kinds of instruments: Petersen's grab and Kullenberg's sounder. We had made two series of water-samplings which had enabled us to ascertain the salinity, oxygen-content, temperature, etc. of the water from the surface down to 10,300 metres depth. Then we had successfully tested the non-magnetic sphere at a depth of ten kilometres, and three trawls had proved that organic life

can exist at a depth of 10,400 metres. In addition there was Professor ZoBell's catch of bacteria and his success in getting them to stay alive and to reproduce themselves under artificial pressure corresponding to that under which they lived at the bottom of the greatest deep in the world.

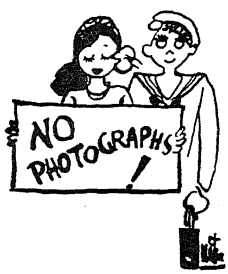
We had reason to be satisfied and there were other tasks awaiting us at the Java Trench, the Tonga Trench and off Puerto Rico.

We sailed to Cebu to fuel. An important chapter in *Galathea's* trip was ended.

The voyage continued.



CHAPTER VIII.



We had not expected much of Cebu which is a bunkering station and little else. However, it proved remarkable because it was there that we made the acquaintance of Severiana and heard the sad tale of Olsen. Although Cebu is a modern town and a busy port, lying as it does in the centre of the seven thousand islands of the Philippines, it has about it something of the atmosphere of the South Sea Island of romantic tales, a distant echo of sirens' song which has earned it the reputation of being a port where more sailors desert their ships than anywhere else in the East.

Severiana was a lady who owned and conducted a flourishing business as ships' chandler. She herself went aboard to see that the steward got the things he needed. She herself carried the sacks of potatoes up the gangway and went to the market to pick out the tenderest water-buffalo joints. She had three sidelines—a laundry, a restaurant and a dance-bar on two storeys. "The only double-decked dance restaurant in the town," as she proudly announced in her brochure, and they were all under the one roof.

It was in her dance restaurant that we heard about Olsen: let us call him that, though that was not his name. He had been a seaman in a Scandinavian boat. It is

not easy to discover what such a seaman thinks in the ordinary course of events. Presumably he doesn't regard life at sea in quite the same way as those who write books about it. For him it must be mostly a question of hammering rust and washing decks; of sharks in the sea and sharks ashore; and perhaps a peevish wife and some income tax arrears at home. Then perhaps he discovers that the cigars for which he paid such a lot in Port Said taste like hay, and the shoes he got in Singapore blister his heels whenever he puts them on. The mate has his knife into him, and the papers are talking of war all over again, and so he goes off. That was what Olsen did.

Actually Olsen was very up-to-date and quite in the fashion. He was an escapist, though possibly he had never heard the word. He woke up to find himself in a palm hut, six black pigs were grunting reassuringly in the mud between the piles on which the hut was built. A cock crowed. Two mangy dogs were having a fight. Olsen's head felt as though it were splitting, but then a soft brown hand laid a wet cloth on his forehead, and there miraculously was a glass of beer set within reach of his hand.

Cebu is a much more friendly place than Manila or Port Said. Olsen's pocket book was in his jacket pocket where it ought to have been. His watch was ticking on the bamboo stool beside his bed, and his blue clothes lay neatly folded at the foot of the bed, and there too stood Marina.

Olsen gradually came to life again. The palms rustled above the roof of the hut and Marina brought

him another beer. Marina loved Olsen, and half his wages was still left. Olsen sat on the verandah drinking in sun and beer and the sight of Marina. Somewhere out there his ship would be sailing on her way to Yokohama, and with every beer he drank the hated deck hose, rust hammer and mate withdrew farther and farther from him.

The family and neighbours came sauntering up and Marina introduced them. Proudly she showed him her son, two years old, fine family, father first engineer on a Dutch boat from Gothenburg. It was he who had taught her to speak a little Norwegian, said Marina. Olsen took the boy on his knees and felt happy.

There was a time once when the Philippinos thought that the Americans looked down on people whose complexions were slightly sunburned. But then came the war and MacArthur and a few hundred thousand soldiers who very quickly convinced the brown population that theory was one thing and practice another. And Marina required an Olsen to wipe the memory of Sergeant Tom Collins of Milwaukee from her thoughts. Tom's daughter was called Molly, and it was she who brought the beer from the Chinaman's shop round the corner.

Olsen bought the hut with all that was in it. A rickety hut with a roof of pandanus straw, furnished with a bamboo table, an iron bed, an earthen brazier, an iron pot, a deep bosomed girl with gold teeth and velvet eyes, a snotty baby boy, six black pigs, a tame crow, two parrots, and a girl called Molly, who never failed to notice when the bottles were empty.

That first evening Marina and Olsen had two pesos worth of waltzing at Severiana's place, two pesos in the juke box gave twenty waltzes, and they never altered the tune until the other customers became really threatening. The next day Olsen bought a little pony, and one of the little carts which swarm in hundreds on the streets of Cebu. It was a splendid little cart with red and green flowers painted along the sides. The pony was perhaps not so good as it might have been, but neither did it have any inclination to bolt. Olsen was a practical man, and he was going to set up as haulage contractor to supplement his income. Molly, Marina and himself saw to it that he never became quite sober. Soon the hut was surrounded by a rampart of empty beer bottles, and the six little pigs staggered about with blissful expressions delighting in the dregs.

When Olsen went out driving the tame crow and the two parrots sat on his head and shoulders. On one occasion he fell in love with a black dog and bought it as a present for Marina. It was a large dog and it soon learnt to carry the basket with the beer bottles for Molly.

This is a true story and so I cannot give it the happy ending it did not have. Cebu is not large enough that such a piece of gossip should be overlooked, and people talked about Olsen. Then one day, one early morning, Olsen's Consul found him. He was sitting on the footpath in front of his hut. The pigs were grunting round about him and the crow was sitting on his shoulder, but apart from it and a pair of gym shoes Olsen wore no other clothes. He was as brown as a Philippino, and there was a look of enchantment in his

light-blue eyes. He had lit a fire on the ground and was busy poaching seven duck eggs in a rusty frying pan.

There was no evil in Olsen, nor was he the type that throws his weight about. On board, they had always considered him a bit of a silent chap who just got on with his own work, washed the deck and hammered rust, hammered rust and washed the deck. And that is what he is probably doing now, somewhere in some ship, but if you look closely at him you will see that there is something about him that sets him apart from the others, for Olsen has *lived* for four whole days in Cebu, and there are so few who are able to live.

It was the Consul himself who told me this story, and I am not at all sure that at the bottom of his honest Scandinavian heart he did not envy Olsen.

* * * * *

When we sailed away from the Philippines it was with course set for the second of the great abysses in the oceans of the world—the Java Trench.

In the Philippine Trench the difficulty had been in keeping an even depth while trawling. The depth was, of course, reasonably constant along the length of the trench, but in breadth the deepest part was only one to two kilometres. When a ship is going very slowly, at a mere two or three knots, wind and current can play old Harry with the course, yet we did not dare go any faster because of the trawl seven miles below us. There was a continual risk that the ship would be driven sideways off its position over the deepest part of the trench with the result that the trawl would have been

dragged up a steep slope, and we should have had to begin all over again.

From the charts we knew that the Java Trench was some two and a half kilometres shallower than the Philippine Trench, and it looked as though its deepest part was a good deal broader than in the former. Otherwise we knew little about it, for it is not one of the best charted places in the seas. Nor do ships often have business to take them to those parts south of Java. In fact, during the ten days we lay over the Java Trench we did not see one ship.

First we had to chart the bottom with the help of the echo-sounder. This showed that the bottom of the trench was a good deal broader than the Philippine Trench, but it was by no means so smooth and even as the other. The profile drawn by the echo-sounder revealed a bottom quite hopeless for our type of fishing. Nothing but ridges and peaks and valleys on which our trawls would have been torn if they had not remained there. We cruised to and fro, took hydrographic stations and fetched samples of silt from the bottom. These were most promising for fishing had we been able to fish, for never before had those little shovelfuls of mud been so rich in animal life. We measured light and analysed water samples. Everything went excellently except that we were unable to make any use of the most important instrument of all, our trawl. To trawl at those depths demands an even surface on the bottom, at least six or seven miles long.

Once again we had come south of the Equator. Expecting heat, we were pleasantly surprised to find the

temperature fall day after day. People began to put on clothes and to show more interest in their meals. The cooks had to reckon with larger helpings, and then one morning two whales appeared alongside; a fin-whale with her calf. They blew and dived and turned their bellies upwards as they went under the ship. They snorted and played and lured everybody up on deck, for on those great depths where the water is so poor in nourishment, we were not accustomed to finding animal life on the surface. Our zoologists of course turned up their noses at the whale. For a true zoologist an animal's interest is in inverse proportion to its size. Our scientists were still wanting to get our trawls down to the great depths and to investigate the Java Trench. However, the monsoon was blowing strongly from the south-east; there was a considerable swell from the south, and a strong current was carrying the ship westward. It was quite impossible to reckon leeway, and those on the bridge were on the point of despair, as every other minute the telephone shrilled and a voice reported that the wire was pointing in under the ship, or that it was inclined 30° to starboard, or 70° to port. We measured angles and anxiously watched the profile of the bottom drawn by the echo-sounder. It was impossible to get the net down to the bottom.

The ship lurched in the swell so violently that the silt-sampler smacked its jaws together when it was still halfway down, but that, of course, we only learnt four or five hours later when it had been down to the bottom and brought up again. The nets were torn to ribbons by sharp rocks and it took eight to nine hours before we learnt that. Time after time the trawls came up after

being let out on ten thousand metres of wire, and all they contained were fish that swim in the free layers of water, with none of the starfish, anemones, etc., that show that the trawl has been dragged along the bottom.

Not all our work was in vain. One trawl brought up a fish from greater depths than fish had ever been caught before. The herring trawl brought up from 7,330 metres a Bassogigas of the Brotulid family, a family that is only known from the rare occasions when oceanographers have had their nets down at really great depths. The specimen *Galathea* obtained belonged in all probability to a hitherto unknown branch. Pretty it was not. It was a fish like an eel-pout with a pale grey behind and blue-grey head. It had almost no fins and very small white eyes.

If we did nothing else we were able to obtain a good picture of conditions in the Java Trench—its temperatures, currents, its type of bottom and the possibilities for existence of animal life.

From the Java Trench we went to Djakarta, and there the Indonesian Ministry for Information and Propaganda presented everybody on board with a brochure the opening sentence of which was: "If you are merely in search of the romance of the East, if you are thinking of dusky-skinned women, palm trees and tropical moonlight, we would advise you to look for them elsewhere than in Indonesia."

The next day I had quite a long conversation with the Minister for Information, or rather, I listened to quite a long monologue.

"We are not particularly excited when we see you or other foreigners come here," said he, "but we are interested in all the dollars you spend while you are here . . . For the time being we cannot do without either foreign money or foreign experts, but we hope that the day is not far distant when we shall be able to live without the latter."

We asked for assistance in making a short film that would show Danish school children what Indonesia looked like, how the people there lived and all the rest of it. The Minister of Information promised to send a man with our photographers; the Minister of Education assured us of his support in filming the famous old Javanese dances.

Nothing came of either. They did not wish us to take pictures of the native population washing clothes, bathing and swimming in the long canals with which Djakarta is criss-crossed. They did not want to show us the old dances, and when our photographers tried to photograph that most photographed of all subjects in Java, the Palace in Buitenzorg, with *victoria regis* swimming on the surface of the lake in the foreground, the superintendent of the garden stopped them. The same thing happened when we tried to photograph the colourful scene of the markets.

"What then may we photograph?" I asked the mayor, a small, smiling and very amiable man.

"I will send a man with you. He will show you our new hospitals, the places where we distribute milk that has been treated at the hospital according to the strictest principles of hygiene. You will be able to get

beautiful pictures of the excavations being made for our big new stadium, and of the model town that we are founding ten miles outside Djakarta."

It is always the same with these new countries and totalitarian regimes. They want you to photograph their dreams of the future. They require that that sober instrument, the camera, should clothe their dreams in brick and concrete, should take photographs round the corner of next year and the year after, but nothing is allowed about the past, nothing that could remind them of earlier humiliations and imperfections. Yet, when such a Minister for Information denies the old dances and the old dresses, the cocks all crow in the villages of Indonesia, crow loudly and shrilly, for it is just what the Present is now denying that *is* Indonesia. It is just those things which have been strong enough to survive the centuries which the Present should use as a foundation on which to build its dreams.

It is, however, not sufficient description of Djakarta to write only of hospitals being built and other constructions that still exist only on paper, nor by describing the places in that city of two million inhabitants where, if you have a doctor's prescription, you can be given the same sort of milk that we in our western countries can buy in any dairy. Nor can the conscientious journalist go into ecstasies over the experimental farm which is described with such paeons of praise in the propaganda pamphlet *Indonesian Affairs*. At the time of our visit the farm possessed nineteen cows, whose average production was eight litres of milk a day. However, they were the only cows of any kind in

Djakarta and district, and the milk delivered from the hospital consisted mostly of dried milk mixed up with water to which cod liver oil and vitamins had been added.

Naturally one is only too glad to speak of and praise the progress that has been made. But so far it is only very tender shoots which have grown up and none can say whether they will flourish or wither away. What is characteristic of Djakarta and Indonesia is still the life on the canals where women, children and men wash and frolic and play like sea-lions, launder their sarongs, brush their teeth and attend to the needs of nature squatting over the edge of the brown stagnant water. The women are half naked, men and children completely so. But all are smiling, happily splashing and dabbling all day long beneath the blazing sun. The average expectancy of life is twenty-seven years.

For thousands of years the peoples of the East have been ruled by autocrats of various kinds and names. Some have been humane, others devils. Then the Europeans found their way to the East and a new yoke was laid upon the Asiatic peoples. Some of the countries became colonies, others were allowed to retain the semblance of their former government. A couple of hundred years passed during which time the white man was god. Then came the two World Wars; yellow, black and brown man fought on the battlefields of Europe in the Kaiser's war and discovered that lightning did not necessarily strike dead the one presumptuous enough to murder a white man. In fact if that white man wore a German uniform the slayer was praised and

perhaps got a medal for it. The peoples of the East began to reconsider matters, and the spirit of revolt came to life again first here, then there. And after that came Hitler's war in which the white man received a good trouncing from the yellow Japanese. The white man lost face, and everywhere the East threw off the yoke of colonialism.

Now, so many years after their liberation, the peoples of the East are beginning to grow impatient and demand fulfilment of the glowing promises with which their leaders dazzled them. In some places their demands are backed up with machine-guns, and one of those places is Indonesia.

When the Dutch ruled the archipelago they were able to maintain law and order with forty thousand troops. To-day the President has at his disposal more than three hundred thousand, but they are not enough to ensure peace in the land. There is fighting in west Java, in central Java and eastern Java. It flares up here, dies down there. At the end of 1951, for example, the guerilla forces on Celebes sent information that they were prepared to receive a pardon on condition that they were allowed to become part of the Indonesian Army. The Government gladly accepted the offer, which put an end to fighting on Celebes and gave them an additional regiment of veterans. Six thousand of the guerillas were equipped with uniforms, weapons, ammunition, lorries, money and all that belongs to the craft of waging war. Then some great men went from Java to receive the fully equipped regiment in the Square of Macassar. They came, but nobody else. The

guerillas had gone back with all their equipment to the freedom of the mountains to carry on their fight with the government they hated.

To-day everything that is Dutch is suspect, even a Dutch education. But those who weren't educated in Holland weren't educated at all, and though they may have good ideas and a genuine desire to lead their people forward, you need more than love of the sea to enable you to sail a ship. But the cry is still "away with all foreigners".

The oil refineries on Sumatra which, in the days of peace and under European management, produced four to five thousand tons of oil a day, had declined to a production of four to five tons. But those four or five tons were of *Indonesian* production. The warehouses in Tandjong Priok, where in the old days goods came and went both day and night, had got out of step with the coming and going of the ships. The port became choked; ships had to wait for days and weeks, and waiting is expensive. Indonesia is a rich country, but it is not easy to make money when those who should be harvesting rice, growing sugar cane or rubber, gathering copra, boring for oil, felling trees, peeling chinchona bark or mining tin, are either busy fighting or have to work with a rifle slung from their shoulder for fear of roaming bandits. (In all countries the adherents of the opposite side are always bandits.) Indonesia is a young nation, and it is faced with mountainous difficulties. It would be a rash man who would prophesy what will happen.

We had had plenty of warnings about Macassar. We were told that we were bound to get into difficulties at Macassar. They might perhaps let us have a little oil, but they would certainly not allow us ashore. But oil we had to have, for our tanks were empty and Macassar was the only port for several hundred miles where a ship could bunker. We sailed in through a swept channel in a mine field in the wake of a sky-blue troop ship. Here and there a mast stuck up above the mirror-like surface of the water. Some small coral islands on either side of the channel looked as though they were floating in the air. Fragile praus with huge rectangular sails were cruising about the minefield.

We got our oil and were also able to purchase the ingredients for some more of those strange and exotic meals with which the members of *Galathea's* NATIVE FOOD CLUB broke the monotony of the ordinary ship's fare while at sea. On the roof of the bridge we had long rows of shark fins hung up to dry in the sun. They later were to be transformed by Captain Westergaard into shark fin soup. The Captain was a chef of no mean ability, and we were always searching for new and wonderful things for him to cook on his Malayan grill and iron stove which was fed with charcoal: macaroni made of rice, macaroni made from maize, macaroni made from millet, dried prawns pounded into flour and kneaded together into krupuk-udang, agar-agar, which makes food beautifully slimy, cuttlefish, white and green peppercorns which are left to stand in oil and so produce an essence that spreads a sea of fire across your mouth and down your throat; green beans for germination; soya and small stinking sun-dried fish

called Bombay Duck, which give that extra aroma to Eastern curries and other entrancing dishes.

On Sunday, 16th September, *Galathea* sailed out from Macassar harbour and through the minefield into the free channel south of Celebes. Our destination was Australia via the Banda Deep, Gulf of Carpentaria and Torres Strait. That departure marked the end of another stage in the expedition, for we were leaving the waters and countries that are lumped together under the general term "the East".

We had visited Ceylon, the former Danish colonies of Tranquebar, Serampore and the Nicobar Islands, swarming Calcutta, exotic Siam, the great archipelago of the Philippines and Indonesia. Many of us had started off with ideas obtained from Kipling and Rimsky Korsakov. We had encountered the most dreadful poverty, appalling conditions of hygiene, famine and political unrest that no amount of hospitality and kindliness could disguise.

The East was kind to us for those last few days we spent working at the Banda Deep, south of the Moluccas. It was a round basin 7,400 metres deep, and pleasant to work in compared with the narrow furrows of the Philippine and Java Trenches. The weather was ideal, there wasn't a breath of air and scarcely any swell.

It was here at the Banda Deep that *Galathea* lowered the limit at which various creatures had been caught, by one and a half kilometres. The first attempt with the Petersen grab was a failure, but the Kullenberg silt-sampler worked as it always did, and brought up a plug of silt sixteen inches long. The usual water samples

were taken successfully and though the first time we put out the sledge trawl it never reached the bottom, it did bring us a very rare deep-sea eel which it had fished on the way up. This was called *Cyema Atrum*, but you may not have heard of it before. Then the herring-trawl went down, and it brought up enough to show that in this almost enclosed sea in east Indonesian waters there were great deposits of silt. Here, as in the Sulu Sea among the Philippine islands and the Celebes Sea between Borneo, Mindanao and Celebes we found quantities of stuff that the rivers and streams had carried out to sea from the interior of the land. But in among all that land refuse our eager zoologists found a rich fauna which revealed the presence of considerable animal life at a depth of 7½ kilometres. Every time Petersen's silt-sampler was hauled in again it always seemed to bring a little more evidence to strengthen the theory that there are no real deserts in the sea. Our examination of this third Deep of more than 7,000 metres showed that there was life there too.

Then we telegraphed a farewell and our thanks to the Javanese wireless station that had been kind enough to broadcast a special daily weather report for us while we were in Indonesian waters.

As we sailed away there came a last message from Station POB Djakarta, wishing us a fair wind.

CHAPTER IX.

EARLY one afternoon we sighted a blue contour of land to the south-east. There was Arnhem Land, there the northern point of Wessel Island; our first glimpse of Australia. That evening we sighted the lightship which warns carefree sailors that now they really must take care, for they have reached the Torres Strait. We dropped anchor to wait for daylight. When the sun rose the pilot came aboard. He was called Hildebrand and his father had been pilot in Torres Strait before him. That sounded comforting, and the more we saw of the waterway east of the lightship the more comfort we felt we wanted.

The first sight that met us was the wreck of a full-rigged ship, lying where it had been flung on the beach of a little coral island. Only it lay in two parts, the fore part first and the after part a sea mile further east. The frame was a mere skeleton above the waterline, but you could still see the lovely line of her bow. Further in there was another wreck.

"The war?" we queried, hopefully. "The current," answered the pilot. "Hard to starboard; right as she is."

The current was making the water boil along the coral reefs on either side of the narrow channel between the two islands. The sea was deep blue beneath the ship, but twenty fathoms to port it was light green. And

there was light green ahead of us too, and in it some deep mauve that was coral rocks. It was not an easy passage and we took off our hats to the Spaniard Luiz de Torres who found the way through the Strait in 1606. We thought of the other early explorers, Portuguese, Dutch and English, and of their work which Captain Cook completed in 1770. We thought too, with admiration, of the pilots who, ever since then, have been taking ships through that confusion of dangers, not only in fair weather such as we were lucky to have, but also in storm and squall.

Ahead of us we glimpsed a few red roofs and more appeared as we rounded a headland. In the shallow bay behind the point lay a little village, the only one in the conglomeration of larger and smaller islands of the Torres Straits. The island with the village was Thursday Island, famous headquarters of the pearl fishers, and there were the pearl luggers at anchor, trim, white craft of fifteen to twenty tons, every one of them ketch-rigged and looking rather like a yacht. We put in towards a rickety wooden jetty where a cluster of men were sitting with their backs against an unpainted shed and staring at us, as though *Galathea* had been a ghost. One of the men got up to give us a hand with the hawsers. They were natives, Papuans, with a frizz of curly hair topping a low forehead, coarse features, large noses with pitch-black skins and a tendency to scowl. Nearby was a lorry with provisions that we had ordered by telegraph. Then a couple of white men came out from the shadow of the warehouse door, white men in patched shirts and no creases in their trousers. They hadn't shaved for weeks, and what a relief it was to see

that, and know that there were to be no official receptions, no functions of any kind, no red carpet and, presumably, no red tape.

It was four hours before the quarantine doctor came aboard. He had been in the middle of a delicate operation on a native patient, and so *Galathea* had had to wait. I learned later how, single-handed, he had all but got rid of the tuberculosis that ten years ago was such a plague on the poor islands of the Torres Strait.

When the doctor had been aboard and we were able to go ashore, we paid our visit to the highest authority in the village, its mayor, Jack Donwoodie. He was more than a mayor, in fact, he was really a king of Thursday Island and Torres Strait. He owns the largest pearl oyster shell business and most of the pearl luggers. He sells some shells to button factories in the U.S.A., and despatches others to the interior of New Guinea where apparently one will buy a wife. His office and warehouses were down by the water front, where, too, were the Federal Hotel and the Burns Philps' shop. In fact, there was only the shore road separating the houses from the sea and the white luggers. In his offices Donwoodie had a strange collection of extraordinary shells, enormous mussels and huge conches and innumerable little boxes with misshapen pearls and other curiosities.

"Welcome to Thursday Island," said the Mayor, and offered us cigarettes. "We here are very glad to see you, we think a lot of Denmark. Some tea?"

"Thank you, Mr. Mayor, we have been greatly looking forward to this visit to Thursday Island and only

regret that we can't stay more than a few days. Thank you, just two lumps of sugar, no milk."

"It's nice to hear that you have been looking forward to Thursday Island, I only hope you won't be disappointed." Here the Mayor seized either end of his bow tie and pulled the knot still tighter. We trotted out all the usual polite phrases normally used on such official visits. For twelve minutes we spoke of things of no importance, and the Mayor said what Mayors, Ministers and Presidents always do say. Then, for such visits normally last between ten and fifteen minutes, Dr. Brunn took a tighter grip of his stick, and Commander Greve gave a hitch to his sword.

"Mr. Mayor, it has been a great pleasure to us to meet you and your hospitable island . . ."

"Hospitable? Tea!? Gentlemen—now that we've got over the official part, oughtn't we to take our coats off and go across to the blue room in the Federal and see if there isn't a little iced beer left."

That was how we arrived in Australia and with it in an entirely new world.

While our provisions were being taken aboard, everybody possible went ashore, where each indulged his tastes as best he could. The scientists set off to the uninhabited islands in the Straits to add to the ship's collection of land animals and sea birds. The crew found themselves invited to Papuan, Chinese, Indian, Singhalese and white homes. They were given beer in the bar of the Federal Hotel and ate chow-maing and long soup in the Chinese shop on the corner. And in the evening most of them went to the cinema where they sat among

palm trees under the open sky and watched an aged and very worn film.

The only ones who were not very satisfied were the souvenir hunters. For Thursday Island has no savage tribes, no old civilizations, and no natives who weave mats or carve wood. The only souvenir to be bought on Thursday Island was a pearl, and there we drew the line. However, it doesn't cost anything to have a look at the pearls or to learn something of the industry.

Ships and men have gone down in Torres Strait ever since the white man went to those distant parts. To the south is Australia, represented by Cape York, to the north New Guinea and between them goes this fearful, incalculable maelstrom. One ship will pass through with absolute ease, another will hole herself on the coral almost before she's got into the Strait. When it is high water on Thursday Island it is ebb at Prince of Wales Island across on the other side. The current can be slack one hour and running at eight knots the next. There are no definite rules or times by which you can go. The moon here seems to have got her powers of attraction thoroughly mixed up.

New coral reefs are always being formed so that the charts are seldom reliable. Pilots have to acquire a sixth sense and heaven help the skipper who thinks he will be clever and take his ship through on his own at night.

Thursday Island is just under two miles long and not quite one mile wide. It has a population of a thousand or so of whom three hundred are white. Together they represent most races and languages. If women did not like pearls, and if zip fasteners had made all buttons

unnecessary, Thursday Island would be as deserted as the other islands in the Straits are and have been. The pearl itself is a by-product of the trade in mother-of-pearl. The chief sources of mother-of-pearl are the Persian Gulf, Ceylon, the Bight of California and the North Australian waters. In addition there are lesser sources such as the Solomon Islands, the low Tuamotu Islands in Polynesia and the islands in the Gulf of Panama. The Aztecs knew about pearls and used to fish for them in the bays round Panama until they were exterminated by us Europeans.

It was Captain Banner of the brig *Julia Percy* who is said to have been the first to have brought the news that there were pearls in the Torres Strait to the world in general, that is to say, to Sydney. That was some time in the sixties, and at once schooners were equipped and sailed northwards, many of them with shanghaied crews. By 1878 things had begun to straighten themselves out. The Government had intervened in the worst cases of exploitation of the natives, and a few ships had been confiscated. The headquarters both for the diving and the authorities had been established on Thursday Island. That was the beginning. Just before the last world war Thursday Island had over three thousand inhabitants and a huge fleet of pearl luggers.

It was the Japanese who systematized pearl diving. They lowered the divers' limit by twenty fathoms. The more phlegmatic white and native divers had regarded twenty fathoms as the limit at which a diver could work, but the fatalistic Japanese went down as far again, and many of them were hauled up with air bubbling in their

veins and all but ready to be taken to the little cemetery on the height above the harbour on Thursday Island. How many victims were claimed by this diver's disease can be seen from the long rows of grave stones with Japanese lettering which you can see there.

The war put an end to that madness. Nowadays the Japanese do not have access to the Torres Strait, and the divers have reverted to the old depth and methods.

They look like white yachts, most of these pearl luggers. They are light elegant craft, ketches most of them, of fifteen to twenty tons, with a crew of ten or so natives. There is the diver, his trusted "first man", four men for the pump, one to hold the diver's lifeline, the rope by which he makes his signals, and then a cook and a couple of men to clean the shells. There is no close season and the weather has to be pretty hard before the luggers will run for shelter. They work the whole of the Torres Straits.

Thursday Island is the centre and along its water front stand the warehouses of the buyers to which the sacks of mother-of-pearl shells and cheaper *trocas* shells are brought to be sorted and despatched all over the world. The greater part which used to be sold to the button factories of Germany now goes to America.

The pearl diver works in the fairy land of the coral reef, among swaying venus fans, sea-anemones with butterfly fish and parrot fish darting in and out among the branches of coral trees. But his eyes are only searching for some grey nondescript lumps that lie scattered about the floor of the coral forest among the dead blocks and colourful flora and fauna. He breaks them loose

from the block on which they are fastened, or picks them out of the brown mud, and puts them into his string bag as he slowly walks along. Above his head the lugger drifts with the current at a speed adapted to suit the diver. The oysters are not thick on the ground and even on good banks there can be considerable distances between the individual shells. To collect four to eight shells in one dive is considered a good result, and a total annual production of five hundred tons for the entire Torres Strait is by no means a bad one. That works out at some eight tons per boat, and makes a total, at present day prices for mother-of-pearl of somewhere around £250,000. To this must be added the smaller income from trocas shell which is fished in shallower water without the use of a diving helmet, the diver merely wearing a pair of goggles. The pearls themselves are of no significance in the turnover, and to prevent crews trying to cheat, the divers are allowed to retain any pearls they find as their little perquisite. It is seldom they find more than a couple of pearls a year, and most of these are small. It does, of course, happen that a lucky diver finds a pearl which can be sold for five hundred pounds or so, and then there are great junketings along the water front on Thursday Island.

The shells are opened the moment they are emptied out on deck. The oysters themselves are removed and threaded on a string and hung up in the shrouds. Dried pearl-oysters are excellent, both in soup and in curry. Before being threaded on a string they are well fingered, for pearls have been discovered in many places, and not only in a sort of blister of mother-of-pearl on the shell itself. When these have been sawn out they are known

as barroque pearls and are used for necklaces or rings. The divers call them blisters. It *can* happen that such a blister forms over a large and perfect pearl, and as a rule big blisters are sold along with the shell to some pearl buyer willing to gamble. He pays a good price and the risk is his. He may find a splendid pearl beneath the thin skin of the blister, or it may have formed over a little lump of mud.

All pearl fishing is a gamble. The pearl buyers buy the pearls as they are when they come out of the mussel. They can be most irregular and matt in sheen. Using a little file the buyer peels the pearl layer by layer like an onion; perhaps a lovely pearl emerges as soon as the first skin is removed; perhaps it remains muddy and depressing right to the core. If that is so then you can throw it in the dustbin.

The shells themselves are graded and packed in cases containing two hundred, and sent to San Fransisco. That is ordinary, unromantic business, but now and again a case of selected gold-lip shells is loaded into a privately chartered aeroplane, which, when it takes off, flies north, and rises to ten thousand feet so that it may fly through a pass in the savage mountains that are the rampart to the interior of New Guinea. That plane will land on a stretch of grass and taxi up to a trader's little shack. The case with the oyster shells will be hauled out by a crowd of very naked and very black gentlemen with pins stuck through their noses and the feathers of birds of paradise in their very curly hair.

In the interior of New Guinea pearl oyster shells are things of great value. With a good one you can buy

yourself a strong young wife who will work for you for years and years and years. In the souvenir shops of Sydney such shells can be bought for eight shillings apiece. But then, of course, there is no money in New Guinea. Attempts have been made at counterfeiting; in fact, it is possible to make pearl oyster shells and other shells of plastic that are astonishingly like the real thing. It is said that before the war one of the big missionary societies was using cowrie shells as means of payment. They were very popular, but then the government discovered that the shells were "made in Germany" and the Customs and Excise confiscated the next consignment. So if you wish to buy a wife in the interior of New Guinea you must still use the currency provided by the pearl divers of Thursday Island.

In the roads off Thursday Island the luggers come and go as they have done for a hundred years, and as they will do until the makers of plastics discover how to make mother-of-pearl buttons that will neither bend nor break in the laundry. Until then Thursday Island will remain one of the few enclaves in the world where life is the same as it was in the nineteenth century, where there is still an atmosphere of south sea romance, and where the conversation you will hear in the blue room of the Hotel Federal could, with but little alteration, be used for one of Somerset Maugham's plays.

We left Thursday Island on a Sunday morning, 30th September, and set course for Port Moresby to get the fuel oil that Thursday Island had been unable to give us.

The swell was breaking white over the reef when we reached this, the largest harbour in New Guinea. The

large harbour consisted of a wooden jetty, a large T on piles just long enough to accommodate *Galathea* on its long side. The rest of the jetty space was occupied by a laid-up ship equipped as a laundry, and a little Australian gun boat on a visit from the mainland. The harbour was full.

Months may pass without Port Moresby seeing anything larger than the local luggers and sailing canoes. Sea communications with Australia have shrunk to next to nothing. There were two large Sunderland flying boats and a Catelina lying dipping at their moorings by some red buoys out in the harbour when we arrived. It is they and their like which have ousted the slow tramp steamer together with the big Cloudmasters and Skymasters which were landing and taking off with the regularity of a pendulum from the aerodrome outside the town. In fact New Guinea has been air-minded ever since it was "opened up" in the beginning of the thirties when gold deposits were found in the sand of its rivers and unknown human communities in its forests and valleys only a few score miles away from the coast up and down which our ships had been sailing for centuries.

That new country was conquered from the air. Heavy dredging machinery was flown in and assembled at Bululo and Eddie, and before long enough money had been made to fly the materials for nice houses and elegant bars to this new Eldorado. The tiny communities on the coast became busy commercial centres, supplying the interior with all that it needed. The names Salamaua and Lae appeared on the map, and on the other side of New Guinea's long tail Port Moresby grew

up, the town where the Governor lived, and the administrators. The town itself lies on an isthmus with the sea breeze blowing up and down its street. There is a palmy beach, one or two fine new buildings, and a great number of hurriedly erected tin shanties. There are four or five streets that to some extent deserve the name, and an entirely unnecessary policeman directing a minimum of traffic at a sleepy crossing.

The government has its own town to the north of the other, and on top of the slope on which it lies is the Governor's residence. Between this government town and the harbour town is the native quarter Hanuabada. Here past and present meet in a way that does not always flatter the latter. Most of the natives still live as was the custom on the coast of New Guinea before the white man came, in huts built on piles out over the shallow water. From the point of view of hygiene this is an excellent method, as the tide removes all refuse and rubbish. A few kilometres to the north and south of Port Moresby there are still villages of this old-fashioned kind with the huts built of bamboo and palm. Hanuabada, however, is a modern town, and so its houses have to a large extent been built of thrown-out packing cases, motor-car packings, tomato ketchup cases, etc. On the walls you can read the names of some of the best-known men in the world—Heinz, Singer, Ford, Tuborg and Philips, and on some of the houses it is also written that they were made in Japan or Germany, but that can hardly be accurate as the architecture is most obviously local. However, the life people live in the modern houses of Hanuabada is not very much different from that their fellows live in the villages up

and down the coast, except that the people of Hanuabada have acquired a need for coco-cola, wild west films and lager beer of which their fellow countrymen in the remoter villages do not yet know. On the other hand, they also require more sulphur drugs and penicillin.

In Port Moresby our Expedition found itself drawn in three different directions. Up on the plateau, deep in the interior of the island, there was the great attraction of a primitive people which had only just made its first slight contract with civilization. Away to the east was another community which, according to what we were told, was equally primitive, living on a couple of islands and forming a Polynesian enclave in the Melanesian population of the Western Pacific. These two islands, Rennell and Bollana, were a reserve for Polynesians, protected by the government from interference by too enterprising white men. You were forbidden to land there without special permission, and that was said to be very difficult indeed to get, unless you had the most scientific of reasons for wishing to go there. Thirdly, one of the greatest deeps in the world's seas lay among the Solomon Islands which are New Guinea's nearest neighbour in the East.

It was decided that two members of the expedition, Peter Rasmussen, the photographer, and I should take one of the small single-engine planes that fly across the ten thousand feet pass in the mountains in the interior to the district round Mount Hagan and Garoka. We did so and became friends for life with the chief of a village whose inhabitants were just starting their great annual sacrificial feast and orgy of dancing. We were

embraced by warriors with bird of paradise feathers stuck through the cartilage of their noses, and when they let us go our clean khaki jackets were covered with the rancid pigs' fat which they used, and our cheeks were smeared with red and blue off the warriors' painted noses and cheeks.

Four others were put ashore at Honiara, capital of the Solomon Islands, and from there a government boat sailed them down to Rennel where they stayed for thirty-four days until the boat came back to fetch them and their large collection of ethnographica, bird skins, land animals, etc., etc. But however interesting their stay had been, it had also been a bit of a disappointment, for they discovered that the American Air Force had used the lake on Rennell as a landing place for flying boats during the war. Rennell's virginity was gone, and the natives walked about in American singlets instead of home-made *tapa*. They had met chewing gum and knew the irresistable attraction of Camel cigarettes, and the missionaries had won a firm foothold there and rid them of a number of old heathen customs.

While they were there *Galathea* had been at the Solomon Island Trench struggling with bad weather, a heavy swell and a number of mishaps with the equipment. Thus little was accomplished, but enough to have made the visit well worth while from the scientist's point of view.

Then, after several days of the work with which all were now so familiar, the after trawl-drum had begun to heat more than it ought. An examination showed that the axle would probably have to be re-ground and

new bushes provided before the winch could be allowed to work again. That was a bigger job than *Galathea* herself was able to tackle and it had to wait till we came to Sydney with its large shipyards and workshops to get put right. Luckily the fault had developed almost at the end of the time allotted for work at the Solomon Trench and so *Galathea* sailed back to Port Moresby and from there to Brisbane.

* * * * *

Galathea sailed from Brisbane to Sydney, from Sydney to Adelaide and from Adelaide to Melbourne. Everywhere Danes streamed down to meet her. Some of them had only come out after the end of Hitler's war, but most had spent the greater part of their lives in Australia, or had been born there. Some of the very young asked us to excuse them for not speaking much Danish, but grandfather had gone out in the 'seventies and had been too busy clearing land or digging for gold to do much about teaching his mother tongue to his offspring.

Australia is one of the most classless countries in the world. We saw that in Melbourne and in Adelaide; we saw it in Sydney and Brisbane and for that matter in Port Moresby too. Of course, there are differences in people's bank accounts, but that seems to be all.

"Hullo, chum," says the driver of the taxi as he pulls up beside you in answer to a wave from the pavement. "Hop in, old man," he says, and in you hop, somewhat bewildered because there are already a couple of passengers sitting there. However, it is apparently all right. The lady is going to George Street, the elderly

man to King's Cross and you yourself want to go to Bridge Street.

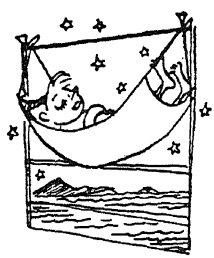
"Do you mind if we drop the lady first?" asks the taxi driver, waving away an elderly lady who says she wants to be taken to Rose Bay.

But you do get accustomed to it. At first it offends the remains of one's European sense of the decencies and exclusiveness of life. Then you think that it is rather nice, at any rate until you find yourself sitting beside the driver who will make the greatest effort to entertain you. This is rather a hopeless task, in the first place because he appears to be talking a very Cockney English, and secondly because the cigarette stump in the corner of his mouth would make anything unintelligible. If you did understand what he was saying you would find that, in common with ninety-seven per cent of all Australians, he could talk of nothing but horse-racing. Horse-racing has acquired the status almost of a state religion, and Winslow Boy, Dream Girl, Lady Joy and their fellows constitute the only real aristocracy the Australians recognize. Otherwise Australia is middle-class from top to bottom, and snobbery is all but unknown.

Our guardian angel in Australia was the Danish Consul-General, Henning Hergel. He came aboard in Port Moresby with his wife, and he left us in Brisbane, only to reappear in Sydney where he had blossomed out into all his official majesty of gold braid and three-cornered hat. He delivered speeches, official and unofficial, and was everywhere where *Galathea* was. Girls wept, men waved and paper streamers broke when

Galathea left Sydney, but Hergel was at his post till the end, and when we reached Melbourne there he was again, arranging, representing and even glad to see us. He too was the last to leave the ship before she set sail away from Australia, and we were in a way surprised not to find him standing on the quayside at Wellington to greet us there.

CHAPTER X.



As *Galathea* sailed through Bass Strait on her way to New Zealand we all got into our thick winter blues and out came our oilskins. As we crossed the Tasman Sea it was stormy and horribly cold; at least, 22° Centigrade feels cold when for months and months you have been accustomed to 36° and over. The Tasman Sea is the Biscay of the Southern Hemisphere, and we found that it lived up to its bad reputation.

The purpose of our visit to New Zealand was to obtain material for a comparison of conditions in Scandinavian waters and those in roughly the same latitude on the other side of the world. New Zealand most nearly corresponds to the position of Scandinavia in the Southern Hemisphere, and it has its own fjords which are very similar to the famous ones of Norway. Hitherto there had not been the proper material for a scientific comparison, and *Galathea's* task was to try and collect it.

We reached Wellington in time for Christmas. It was this visit there which gave us an interesting insight into the question of who or what are Denmark's best ambassadors abroad. When you think that Denmark is only a little pin point on the globe, a sea-anemone fastened to the rock of the European continent, it is

quite surprising how much people know about us abroad. But the reverse is also true. I had always thought that Thorwaldsen was known all over the world, but he isn't. He is quite unknown except to a select section of lovers of art, and the same goes for Carl Neilsen. But the tango *Jealousy* is loved in every dance hall from Labrador to Cape Town, and Heering's Cherry Brandy is as well known as Danish beer. And who hasn't heard of Danish Blue cheese. When you go out and about the world you have to revise your ideas a bit. Another thing that surprised us was the number of people who are thoroughly familiar with Danish social legislation, gymnastic systems and Danish ballet. So people's conception of us is not just confined to pigs and butter.

From Wellington we made a little excursion down to Campbell Island. It would have been a pity, having got so far not to have taken advantage of the benevolence of the New Zealand government and gone a bit further south to get our zoological museum a rarity that few museums in the world possess: a group of stuffed sea elephants to go with its famous group of African lions. That is how *Galathea* came to sail down through the Roaring Forties and into the Howling Fifties, where few ships go and the ocean lies deserted most of the time.

Galathea fell in with a storm, with several storms. The waves towered up to the height of the bridge, spume smoked from their tops, and gusts of hurricane force whistled in the rigging. A couple of port-holes were burst in, but they were soon covered over with an iron plate, and barring a little water on the floor and a few wet cigarettes, no damage was done.

Campbell Island is the most northerly of the Antarctic Islands. It lies on 52½° South and 169° East some 400 miles south of New Zealand. We put into Perseverance Harbour and dropped anchor there, well protected from all storms. The island's entire population, the four men who work the meteorological station there, came aboard to celebrate New Year's Eve. It was a long evening, for during the night it blew up to a piping hurricane, and it was quite impossible to get a boat into the water. *Galathea's* anchor could not hold her and the engines had to be called into service. During New Year's Day there was a lull, which gave the meteorologists a chance to get home to their wooden hut and our scientists to get ashore.

Campbell Island is as grim and inhospitable as only an island can be which lies by itself, far off the beaten track, where it is whipped by storms and scorched by salt spray. No trees have been able to grow to any size there. Vegetation is sparse and confined to few kinds of plants. Coarse high tussock grass makes walking across the island most laborious, and the only things to brighten that grim landscape are some yellow lilies.

Two deep, narrow fjords cut into the island from the east, Penguin Harbour and Perseverance Bay. The latter is the better.

The island was formed in the violent volcanic eruptions of the tertiary period, but it is long since it showed any sign of volcanic activity. It is thought that once there existed a bridge of land between the Antarctic mainland and the more northerly continents of the southern hemisphere, and that of this bridge

New Zealand and the Antarctic Islands are all that now remain. This was a question on which light would probably be thrown if it were possible to examine the tiny creatures living in the soil and the microscopic life in the mud at various depths in the surrounding sea and fjords of Campbell Island. It had not previously been possible to do much in this line, and so *Galathea's* silt-sampler got to work in the two fjords. Lumps of earth were fetched from shore and the earth sieved through a fine hair sieve and then subjected to a strong light, which caused the living things in it to burrow down into the lowest layer with which they were decanted into a glass tube and ended their microscopic existences in spirit.

The silt-sampler revealed the presence of a wealth of animal life which proved to have an amazing resemblance to that at the bottom of Norwegian fjords of similar depth. Great indeed was the activity in the laboratory, but these were not things about which the layman could get very excited. What did interest us were the sea-elephants.

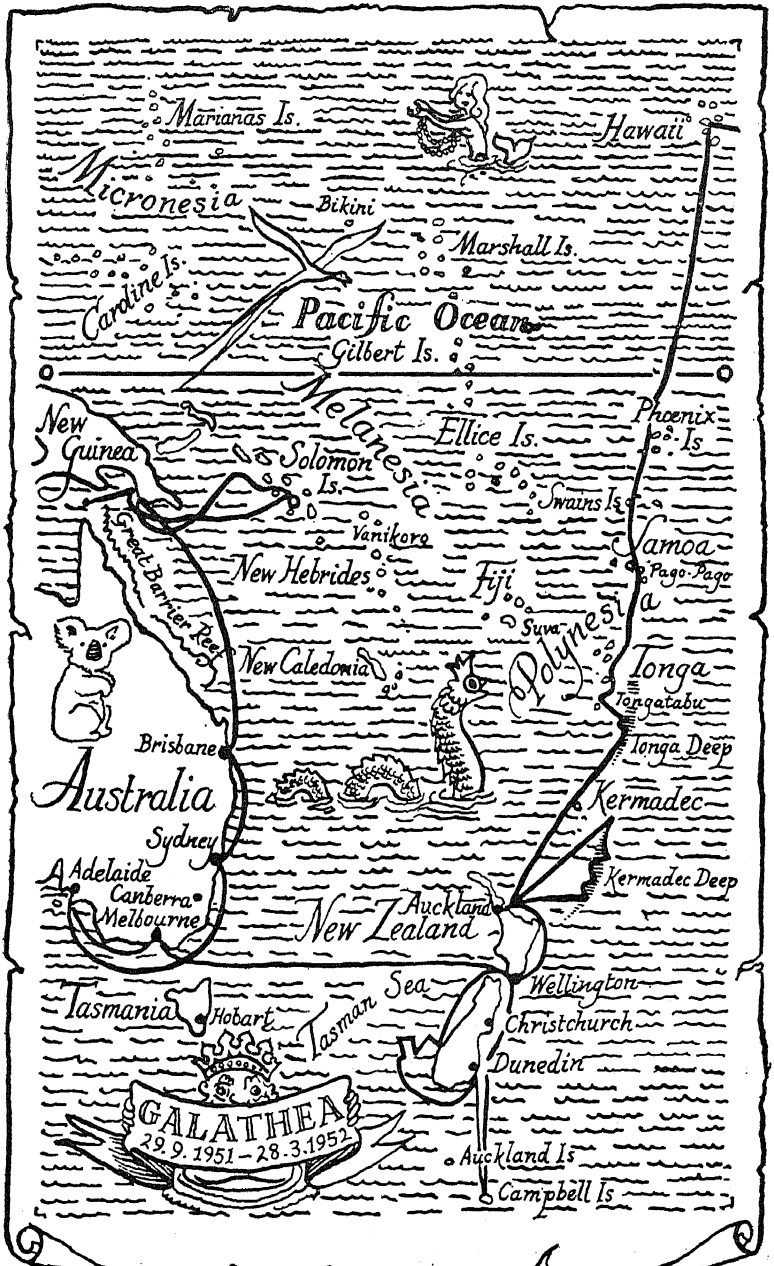
Last century an appalling toll was taken of the mammals of the Arctic. Ruthless sealers slaughtered whatever they could find to get oil: seals, sea leopards, sea lions and sea-elephants, without thought of age or sex. At the eleventh hour the few remaining sea-elephants on the islands were declared protected by the New Zealand Government, and it would now appear that their numbers are increasing.

These large animals seemed to flourish on Campbell Island. Nobody ever goes there; they can have the

island to themselves and there mate, give birth and enjoy themselves. Slow on land and quick in the water, they are some of the most curious creatures the world possesses in its great menagerie.

The sea-elephant got its name because the adult bull has a well developed trunk-like snout which it inflates with air when it becomes agitated and wishes to appear threatening. A full-grown male can be more than twenty feet long and have a circumference like that of a small locomotive. If you approach too near it will lift its head and utter some dreadful roars that echo among the hills, open its pink mouth wide and look terrifying. But there is nothing to be afraid of, as we from *Galathea* quickly discovered. If you are quick on the turn it is perfectly possible to pat a sea-elephant's tail without risking making the acquaintance of its yellow stumps of teeth at the other end. The sea-elephant is, indeed, all but helpless on land. It has only very short flippers and moves dreadfully slowly wriggling along on its fat belly. Where there is a bit of a slope, however, it has discovered an original means of progression that is efficient but most comical to watch. It lifts its tail, raises it upright and then thrusts it so far up and over its back that it finally over-balances and turns a real somersault down the slope. It may perform a whole series of somersaults, and thus reaches the safety of the sea in a comparatively speedy and easy manner. When a sea-elephant is progressing thus, you do have to get out of its way, for were it to roll on top of you it would be like getting under a road roller going at speed.

The old bulls have a deal of trouble keeping hold of


Marianas Is.
Micronesia
Bikini
Marshall Is.
Hawaii
Caroline Is.
Pacific Ocean
Gilbert Is.
Melanesia
Ellice Is.
Phoenix Is
New Guinea
Solomon Is.
Swains Is
Great Barrier Reef
Vanikoro
Samoa
New Hebrides
Fiji
Pago Pago
Suva
Polynesia
New Caledonia
Tonga
Tongatabu
Brisbane
Tonga Deep
Australia
Kermadec
Sydney
Adelaide
Canberra
Melbourne
Kermadec Deep
Auckland
New Lealand
Wellington
Tasmania
Hobart
Tasman Sea
Christchurch
Dunedin
GALATHEA
29.9.1951 – 28.3.1952
Auckland Is
Campbell Is

their wives. When they crawl ashore at the beginning of the breeding season there are lots of young and aggressive bachelors whom they must drive away with menacing noises and snarls. When the harem is at last well established and a suitable site for it been chosen, the poor bull is never safe from attempts at seduction from the flank. Even if he had an eye in every flipper some irresponsible chap would still manage to persuade some thoughtless cow to go off with him. Such things do happen, and when you lumber into the water to give the seducer a thrashing and fetch your wife home, you will probably find that someone else has meanwhile been getting himself into the good graces of those you left on shore. In fact, there isn't even time to eat during the mating season, and as this lasts up to two months for a large harem, even the largest bull will be but a shadow of himself when the flotilla finally puts to sea again.

Galathea came just after the breeding season when the residue of the harems were luxuriating in the mud pools ashore, and small young ones gazed out of round, mild eyes at us who had come to disturb their peace. It was all too easy to kill those we were permitted to slaughter for the museum at home. The only difficult thing was how to shoot them without harming the skin. In the end we discovered that if they were shot in the roof of the mouth when they opened their jaws, not only were they killed instantaneously, but they suffered no damage. The animals we killed had to be skinned and the skins stored in the refrigerator. The skeletons were cleaned and salted and put in some huge casks which we had brought from Copenhagen for the purpose.

Campbell Island is also the home of penguins, albatrosses and other large sea birds. No less than five different kinds of albatross nest there; loveliest of them all is the king albatross. Its snow-white neck, soft, quilted back and the black glint of its sharp eyes give it an appearance of being at the same time mild and graceful and proudly domineering. There were many of them all over the island nesting between the tall tufts of the tussock grass. They showed no sign of fear, even when we went right up to the nest and let the ciné camera whirr right in front of their large sharp beaks.

The soot-coloured albatross builds its nest on jutting shelves high up on the cliff face. It too is a lovely bird with its soft black-brown colouring that is only broken by a chalk-white ring round the eye, a sort of monocle that gives it a very raffish appearance. The albatrosses make a long stay on Campbell Island for their breeding. First they have to pair and mate, and then the egg has to be laid, and by the time it has been hatched there are still thirty-six weeks to wait before the young bird is ready to fly and leaves the nest.

Round about the rocks on the coast are penguins, the gay, cantankerous rock-hoppers with two protruding plumes like pens behind their ears, and with a bright yellow stripe running from the beak across each eye to the plume. They are not always so very sure footed; sometimes they lose their balance and fall over their own feet, providing real farce of the Charlie Chaplin kind. You never grow tired of watching them, they are so comically human.

The booty we took with us from Campbell Island consisted of the five sea-elephants to be stuffed for the zoological museum, one sea lion and an excellent collection of birds of all ages. Then there was a collection of plants and many feet of colour film, innumerable microscopic creatures in glass tubes, and last but not least, Sir Anton.

Sir Anton was a small and very lively baby sea-elephant. The idea was that he should go to the Copenhagen Zoo which had never owned a sea-elephant of its own and only once, many years before, had borrowed an old bull called Goliath from Hagenbeck Zoo in Hamburg. Sir Anton was four weeks old when we took him aboard loudly protesting. He soon settled down, and the lucky thing was that he had just been weaned. which meant that he naturally went on a hunger strike lasting about a month. During this time he shed his first coat of soft baby hair, nor did he recover his appetite until that had been accomplished. We were a little anxious as to whether or not he would take nourishment at the end of the period, but our fears were groundless. He ate so much that he had to be put on a diet and restricted to six pounds of fish a day. He was going to have to endure the heat of crossing the equator and so could not be allowed to get too fat. We gave him a beautiful tank, the water in which was continually being changed, and at the bottom he had some lovely big stones against which he could rub.

When we left Campbell Island it was to go north to Dunedin in the south island to fuel, and from there south through Fouveaux Strait and into the Tasman Sea to

trawl in 17,000 feet of water whose fauna was as good as unknown. Not many expeditions have felt tempted to spend any length of time in the stormy waters off the south-west coast of New Zealand, and so we hoped for good results. Two days after leaving Dunedin we were there. The depth was 14,300 feet, wind strength three, sky overcast, swell comparatively slight. The sledge-trawl slipped over the stern, the wire paid out and we were at work again. When the net came up it was with a fine catch, then the silt-sampler went out, and after it the big herring trawl. When that came up again it contained over forty different kinds of creature, some of them yard-long deep-sea fish with the usual sluggish expression, with small fins and slight mobility. Our zoologists were delighted and were kept busy for some time preparing jars and writing labels. But then the storm came and we had to pack quickly and make for the narrow fjords of the west coast. The seas got up and it was a relief to many when *Galathea* found the narrow entrance to Milford Sound.

We anchored in Harrison Cove, sheltered from all other winds but the violent icy gusts that now and then swirled down from the snow-clad heights that rise sheer out of the fjord for ten thousand feet. Gulls with vermilion beaks and legs circled round the ship. We made the stern fast to a huge block of rock ashore. Lovely waterfalls came tumbling down the perpendicular mountain sides turning into spray as they fell, forming rainbows when the sun struck them, and waving like fairy veils. We lay there in a sort of cosy pot while the storm howled outside.

At the end of the fjord lay the remains of a hotel

which had burnt down some years previously. It was the only house for many miles around and to reach civilization we should have had to go far on foot across the mountains. It was more than thirty miles to the nearest road, and over eighty miles to the nearest house. They are now driving a tunnel through the mountains, and when it is completed it will be possible to drive in a car to Milford Sound. As it is, it takes a couple of days to sail there from the nearest harbour. From this you will understand that the place was not overrun with tourists.

I am sorry for anybody who has to go to his grave without having seen Milford Sound, a fjord wilder and more beautiful than any of the famous ones of Norway. We were lucky enough to see it in bright sunshine, for the rain remained hanging off the coast, while the fjord itself lay filled with sunlight and air that was spiced with the scent of the thick bushes on shore. For the vegetation there is, thanks to the rainfall, as luxuriant as is only to be found round the Equator. Trees clung to the rock wherever there was the least hold for their roots. Many of them were evergreen beeches which I had seen before in Tierra del Fuego. Even more conspicuous were the fern trees which are so typical of New Zealand's flora and which give the country a look of the tropics because they are so amazingly like palms. They really are typical ferns perched on the top of a trunk formed by withered leaf sheath. The wood of the trunk is so hard that it chips an axe.

The trunks of all the trees at Milford Sound were covered with moss and parasites. The whole wood was an impenetrable network of creepers and fallen stems

so that it was hopeless to think of trying to make your way through it. The red mistletoe was in flower and so were the blackberries and St. John's wart. There were thick clumps of digitalis and everywhere were flowering shrubs which had a white flower with a yellow button in the middle, very like a marguerite, with which the bush is also closely related.

Little paradise ducks were paddling along the coast, delightful birds the cocks of which have white heads. The glens were buzzing with summer and insects, chaffinches were chirruping, and the song of blackbirds mingled with the tinkly notes of the bell-bird. At night the kiwi peers out from the fringe of the bushes, that strange bird which is as large as a hen and almost without wings, a survival from prehistoric days as grotesque as the extinct moa.

The moa was the largest bird of all time. Somewhat like an ostrich, only double the size. It would not have been at all surprising if one of them had suddenly stuck its ugly head up among the fern trees and stared at us. There are, in fact, people who maintain that the moa is still to be found among the remote mountains of the west coast. But it will be many years before it will be possible to say whether that is correct or not, for nobody goes there. There are only a few paths from valley to valley and you cannot leave them. Nor will you see anything from an aeroplane as the leafy crests of the trees completely cover up any secrets the forest may have.

We put out our traps to get food for Sir Anton, and to enable the scientists to investigate the catch for parasites, another thing in which they happened to be

interested. There was a fine catch—two small sharks, two colourful sea-scorpions, twenty-four crayfish and a number of mauve slime eels, nasty creatures with flabby flesh, heads like snails complete with feeler horn, and as they twisted and turned in the trap they gave off litres of thick, revolting slime. The fjord was swarming with crayfish, and the traps only had to be ten minutes on the bottom before there would be one in them. We gorged ourselves on "half-lobsters", but then the storm died down and we put out to sea again.

There was a heavy swell and the grab of the silt-sampler would not release. It was a ticklish instrument to work with except when the sea was calm. But the herring-trawl went down to 13,000 feet and came up with a rich booty, including more than fifty different kinds of bottom animals. However, the weather did not allow us many trawls in the Tasman Sea. The wind began to get up again and the swell became a heavy sea that made it difficult to get the laden trawl aboard.

There is little or no traffic at the southern end of the Tasman Sea and the meteorologists have no observation posts in those waters. Thus the weather forecasts were not as reliable as those for other parts, where steamers were sending in reports from many different places. We also sent reports to the Meteorological Institute in Wellington every day, and in the evening when we somewhat anxiously asked for a forecast of the weather expected in our part of the world it was our own report we were given with one or two guesses added.

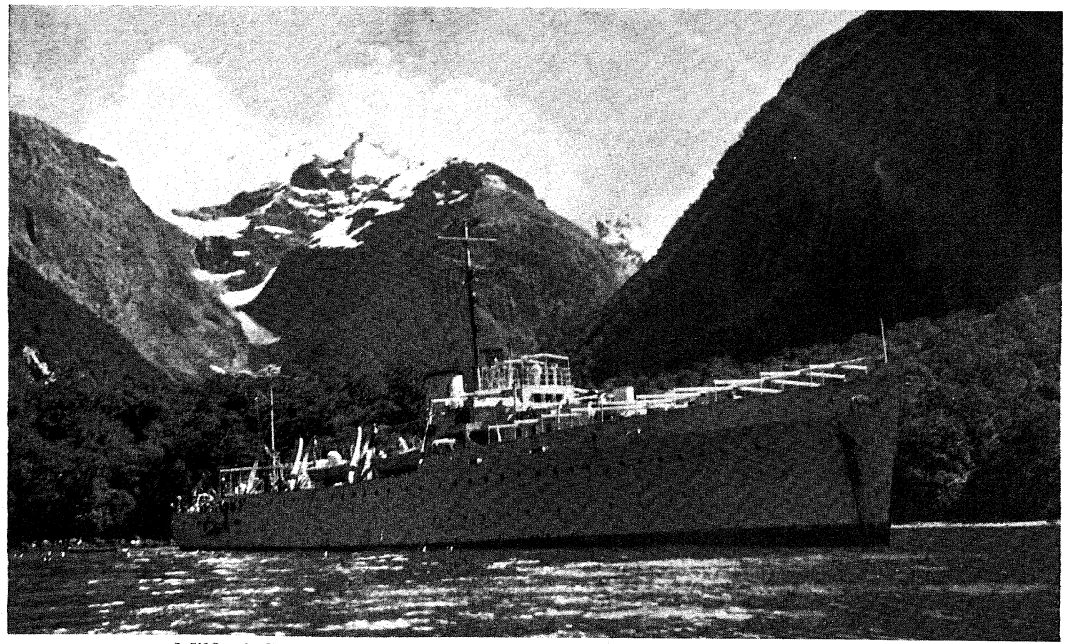
So, *Galathea* once again headed for the bolt hole of Milford Sound. During the night it blew up to a real

storm which was combined with thick rain and low, hanging cloud which made it impossible to make a landfall. A cog-wheel in our precious echo-sounder had broken, so we did not have its assistance in navigating, and there was a short circuit somewhere in the radar and we did not have the necessary spare part on board. So there we were without either, and it was quite amusing to see our sailormen when they were suddenly forced to revert to the seamanship of the old days, and navigate their ship as best they could by dead reckoning. We suddenly discovered that we had a log on board and also that the crew had not forgotten how to use it! And *Galathea* found her way into Milford Sound despite bad visibility. But we did heave a sigh of relief when the arms of the fjord stretched themselves protectingly round the ship once more, while the waves broke furiously over Fox Point threatening to wash away the little automatic light, the only light on that whole stretch of coast. Then the anchor dropped and we were "home" again in Harrison Cove, and at once began a thorough investigation of the sea-bed at the bottom of the fjord.

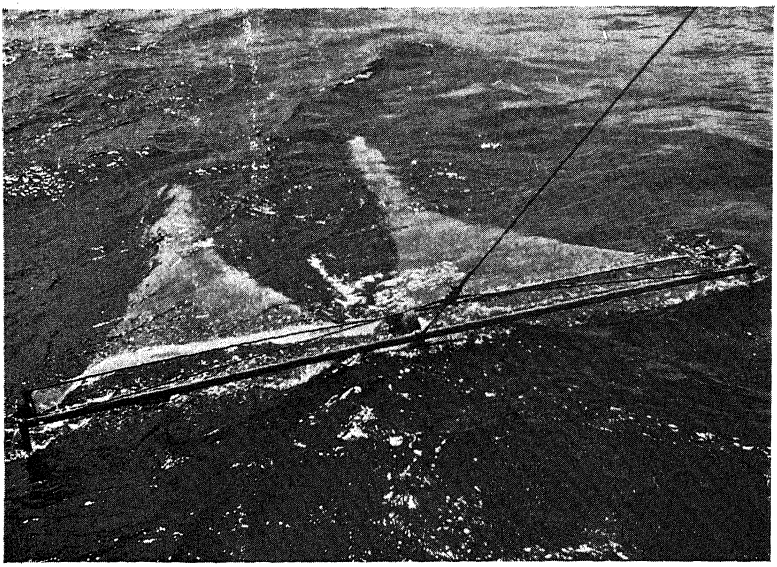
While the scientists did their work a boat-load went on a trip to Greenstone Point, landing in Anita Bay. Before the white man introduced metals into New Zealand the Maori warriors used to use this kind of nephrite stone for their weapons and ornaments, just as our Stone Age people used flint for their axes. Greenstone is related to jade, has more or less the same deep green colour and can be worked comparatively easily to a sharp edge. The Maoris used to get their greenstone on the shore where the sea had washed it out of the

volcanic strata in the rock. Anita Bay was one of their favourite places. We rummaged among the boulders on the shore there and found one or two small bits of the precious stone. They lay among huge lumps of dazzling white marble near the water's edge. We made another discovery on that beach, the unpleasant one that Anita Bay was the resort of millions of sandflies. They were tiny little creatures that you could scarcely see, but they settled on our necks and foreheads and hands and began to bite so violently that we had to get into the dinghy and row out to the motor-boat. They followed us like a cloud, and it wasn't until we had sailed to the entrance, where puffs of the storm came sweeping across the water, that we managed to get them blown away and were able in peace and quiet to lick our wounds. It was over a fortnight before their stings disappeared and all that time the itch of them was intolerable. Our quartermaster had been foolhardy enough to bathe in the fjord, and the sandflies had had the time of their lives. As a result he suffered several sleepless nights during the next week or two. There was a little green fishing boat lying in the lee of Fox Point. We went alongside and bought twenty crayfish for five bottles of Danish beer. They were the largest the man had, so it wasn't expensive.

We had taken with us a brazier, a frying pan and a large cooking pot with a lid. We threw out some hooks and caught five blue cod, the most delicious fish in the southern hemisphere. We fried the fillets in the pan and boiled the tails in the pot, and we thought it was the best meal we'd had since we left Copenhagen. That, at least, was how we felt as we lay back on the



Milford Sound where *Galathea* twice sought refuge from the weather



The trawl coming up from the Kermadec Deep

and some of the creatures that were in it

cushions and gazed up at the snow-clad peaks, the green slopes, the drifting cloud and the black rocks.

The next evening we sailed for Wellington to get the echo-sounder and radar repaired.

There was a stiff breeze blowing in Cook's Strait. The albatrosses escorted us through the Roaring Forties, and Sir Anton sent a final roar of greeting to the south. Then we anchored in the shelter behind the piers of Wellington.

The next morning we put the jeep ashore, for I wanted to go overland from Wellington to Auckland and see a little of the north island. We drove out along the coast through low hills, out past the aerodrome, and the further north we went the cloudier the sky became, and at eight o'clock in the evening, we reached Palmerston North without having seen so very much.

The plain around Palmerston North is one of the best agricultural districts in the north island, and the local telephone book is stiff with Danish names. They don't have cow byres there; the cattle stay out the whole year round and are only brought in for milking, which is done in an open shed in which the most modern machines are installed. Every farm has its own separator, and the skim milk is pumped through pipes straight to the pigs' feeding trough, while the cream is fetched by lorries and taken to the creamery. The dairy farms just consist of an outhouse and a dwelling-house. Apart from the milking machines and separator they have no need of machinery, just as each family does its own work without need of outside help.

All the houses are of wood and they are nicely

scattered about the ground and tucked away in gardens which riot with a wealth of flowers all the year round. But even on the arable farms there is no proper yard with stone well and pump, no trough at which to water the horses, for there are no horses. Yet despite mechanization and modern methods family life is still in many ways patriarchal, and when they gather round the table for dinner the master of the house still says grace as his father and grandfather did before him.

As we drove on northward the plain disappeared beneath green hills with scattered trees, and the country became like a huge park. Sheep could be seen like white tufts among the trees, and soon we were driving through what might have been the loveliest of England's hilly country with small streams bustling away towards the rivers and the sea. Far away in the background was Mount Egmont's beautiful show-capped peak outlined against the blue sky. There were flowers everywhere along the ditches and in all the gardens, the strangest mixture of familiar blooms and sub-tropical plants. Roses, buttercups, auriculas and rhododendrons grew there alongside figs, passion-fruit, grapefruit and lemons. From the edge of the ditches corn-campion and rain-cups nodded to us among bindweed and brambles, but there were also exotic-looking fern trees, and tufts of pampas grass raising its feather plumes on slender stalks a yard or two above the other dwarfs. Booths with apples, tomatoes and strawberries lined the road at short intervals bearing witness to the great productivity of the country. Rabbits and opossums ran across the road in front of our wheels, and here and there a little brown patch on the road

would show where a hedgehog had been too slow and met with an accident.

Then we left the park-like country and drove in among woods, the virgin forest that is still to be found in all its luxuriance. We stopped the jeep for a moment to let ourselves get an idea of what it was the early settlers had to contend with when they first came there. We had lunch and a rest in the little village of Taihape with a hospitable Dane who had hidden her nationality under the English name of Mrs. Bowler. And so we drove on and into the next setting, that of desert, a land of volcanoes, wilder and more brutal than any landscape we had so far seen. We swallowed red dust until we scarcely dared breathe, but we forgot all our discomforts in gazing at New Zealand's two large volcanoes: the one was snow-capped, the other still has red embers inside it and was oozing sulphurous fumes over the whole countryside. Mount Ruapehu and Mount Ngauruhoe they are called. Between the two man has built an hotel, The Chateau, and surely no other hotel is so dramatically situated, right in the front row of the stalls when anything is happening, and with Ngauruhoe something is always happening: a rumble underground, some violent quakes, an attack of coughing in which flames and smoke and stones are expelled from the crater far up into the sky. Yes, when you live in The Chateau you always have that delicious thrill, the queer feeling in the pit of the stomach which is such an important part of modern man's entertainment. We only stayed there one night, and it was not a night when you could sleep, because New Zealand's veterinary surgeons had taken the hotel to celebrate a jubilee, and there will be

no need to say more than mention the bare fact that many of the vets were Scots.

The next morning we drove on northward through a volcanic desert where everything was burnt to cinders and ashes, and so down to a land of lakes where nature suddenly went to the other extreme, as she often does in this fantastic double island which possesses all the natural beauties Europe has to offer, plus a number that you will find nowhere else. There was a wonderful lake enclosed by decorative eucalyptus trees and lombardy poplars, a world of luxurious green to contrast with the deep blue of the lake. There were bushes in flower, people peacefully fishing, campers and tents and blazing sunshine. This was Lake Tahoe, and to get there had taken us far from *Galathea* and the deep-sea expedition, but we ran into them again just north of the lake at Rotorua, the Maori village with its hot springs which are the greatest tourist attraction in New Zealand. It is in fact the only place on the island that has been marked by tourism, with its many hotels, coaches and native guides and all the rest of it. But it is worth it all to stand on the edge of one of those hundreds of holes in the ground from which scalding steam gushes up and see how the Maoris have built their village round these holes and made them serve for heating, washing and bathing. It is also something of an experience to hear the Maoris sing their old songs, even though you know perfectly well that their old culture is being kept alive artificially.

The Maoris, the aboriginal people of New Zealand, are to-day no more primitive than the Danes or anybody

else. They have their professors, their members of Parliament, their clergymen, doctors and artists. Those who live in a fashion that still seems to be primitive are none the less able to read and write and are quite capable of discussing foreign policy. You can't help being glad, however, that progress has not made them lose touch with the past, and above all you wonder what it is that makes the peoples of Polynesia so musical, have such an amazing sense of rhythm, that any scratch collection of men, women and children, with only a few seconds warning, can out-sing any of our professional European choirs and apparently do what they like with any tune. When I think of how the 106 men on board *Galathea* would have stood with hanging heads and sheepish expressions if a foreign guest should have asked for a Danish song!

During our stay in Auckland *Galathea* lay in the naval base at Devonport across a narrow Sound. Sir Anton flourished in his private swimming pool in the stern and thoroughly enjoyed being the centre of interest. He quite stole the limelight from the two little sea-anemones we had fetched up from the the bottom of the Philippine Trench. He roared into microphones and put his head coquettishly on one side in front of whirring film cameras, and he even allowed himself to be photographed for the papers with a *Galathea* cap perched on his head. He was still on six pounds of fish a day.

CHAPTER XI

New Zealand was a turning point. Nobody could have foreseen that Denmark would devalue her currency and so make the price of fuel oil rise by about forty per cent: but that was what had happened. Nor could anyone have imagined that beef would have cost 8s. a pound in Indonesia and potatoes nearly 2s. a pound. We had started the expedition with a fixed budget, and now we were overspent and needed another ten thousand pounds if we were to carry through our original programme. Unfortunately there was no question of getting so large an additional sum, and we had to delete certain items from our programme. Easter Island went. The Galapagos went, and so did the great depths along the west coast of South America, and all the visits we had been intending to make south of Panama. About the only other work that we were likely to be able to undertake was the Kermadec-Tonga Trench, for it lay between our two bunkering ports of Auckland and Samoa, and we should probably also be able to do something in the Gulf of Panama before going through the Canal on our way home.

On our way to the Kermadec Group we touched at Sunday Island. The New Zealand government had asked us to take supplies to the twelve men manning the Meteorological Station there. It proved to be rather a

difficult job. It is a lonely island lying well off the normal routes, and its sides plunge sheer into the sea, where breakers thunder against the cliffs and make landing impossible on most days of the year. Because of this they have a sort of overhead trolley arrangement, very like the breeches buoy used in rescuing people off a wreck. By this means we finally got all the provisions sent ashore in a basket that now and again came perilously close to the foaming tops of the waves.

That little island has quite a dramatic history. Some time around about 1840 two enterprising Englishmen went there with their families to start a fruit farm. Their idea was that they would sell vegetables and fruit to the Pacific whaling ships which were suffering from scurvy. The idea was a good one and the enterprise prospered, while the health of the whalers improved. Then the volcano within the island stirred. There was a roar and the top of the island disappeared and lava began oozing down the mountain sides destroying fruit plantations and vegetable plots as it went. The English had to leave their inhospitable island rather hastily, so hastily in fact that they forgot to take their goats with them. Now the descendants of those goats still live there in a wild state, together with a number of rats which the pioneers no doubt were glad to leave behind.

At the beginning of this century another attempt was made to colonize the island. It did not last long either, for the Germans took the island over at the outbreak of the first world war and deported all its inhabitants. Sunday Island became the base for the privateer *Wolf*

until she was sunk. During the second world war the island was an air base, and now it is a meteorological station for New Zealand.

From Sunday Island *Galathea* sailed to the Kermadec Trench. To the joy and surprise of our scientists this proved to be far more co-operative than the previous deeps. Its walls were not so steep and it was possible to make a bottom trawl up one of the sides and so obtain a picture of life at the different depths.

For three weeks we worked there. The weather was good and three-quarters of the trawls were successful, which is not a bad percentage when you remember that our equipment had to work six miles down. Here we caught more creatures of more different kinds than at any of the other deeps where we had so far worked. Two hundred and sixteen species there were, of which sixteen were fish.

Some of the fish from 2,330 fathoms were comparatively large, over a yard in length, and coloured a delicate rose. Two of the fish had a most fantastic appearance and could almost certainly be put in families that had hitherto been quite unknown. It was not here that we lowered the world's record for the depths at which fish have been caught from 3,250 fathoms to 3,830 fathoms. That was the Sunda Trench, south of Java. And it was still our old friend Bassogigas, of that old and respected family, the Brotulids, which was the deepest caught fish. But here in Kermadec we caught fish down to 3,660 fathoms.

This Kermadec Trench was an excellent place from the scientists' point of view; far better than the Philippine Trench. And it was possible to make

comparisons between life on the sea floor at depths between 3,660 fathoms and 5,660 fathoms, and one of the results of our work was the discovery that even though the number of animal species diminishes rapidly the lower one goes, yet the great depths are by no means empty or deserted. Those species which have adapted themselves to live under tremendous pressures of up to a thousand atmospheres seem to flourish. Some of the trawls brought up amazing numbers of animals of the one kind. One trawl from 4,500 fathoms came up with over a thousand specimens of one kind of sea-slug, and 200 of another, and one thing is certain, that there is plenty of food for larger creatures right down to the bottom of the great depths.

Another thing we discovered was that the Kermadec-Tonga Trench did touch the 10,000 metres, which was 600 metres deeper than had previously been thought. Our echo-sounder also showed that the Kermadec-Tonga Trench was in reality one long trench and not two separated by a sort of threshold as had previously been thought.

Then the time that we could spare came to an end and we set course for the Tonga Islands where we wished to pay our respects to the only reigning queen of Polynesia.

Queen Salote is a lady of some dimensions. She weighs the really majestic weight of over twenty stone. Her realm consists of a number of islands and 30,000 inhabitants who live happy, carefree lives, obtaining their livelihood by making copra, but mostly from the fruits that luxuriate in the fertile soil without worrying

who will harvest them. Their lives are happy, but the shadow of over-population is gathering on the island's horizon, and economists insist that it will not be long before Tonga will be unable to feed its population itself. There are already signs that this is so, but it is difficult to get the carefree natives to see that steps ought to be taken before it is too late.

Queen Salote's rule is that of a gentle matriarch, but no doubt her son will one day have use for all that he has learnt at the University in Sydney. He has already begun to think and talk of reforms, and so is not as popular as he might be, for people do not like change, especially when they are happy. However, the islands are being forced by circumstances to awaken out of their thousand years of vegetation. Progress is upon them whether they want it or not.

Crown Prince Tupouto-o-Tungi will have use for all his wisdom plus a lot of common sense, when his time comes to take over from his popular mother. Queen Salote has reigned since 1918; she has seen the population of her islands double, yet the people still live without worries. They go to the cinema and watch wild west films or Bing Crosby, kiss their girl among the palms down by the shore, and perhaps get tuberculosis by doing so, for twenty-five per cent of the population suffers from it. That is but one of the dire shadows lying across the islands of the Pacific.

No sooner had we left the Tonga Islands than we realized that the 11th March was upon us. The 11th March is the birthday of the King of Denmark, and so the gun-crews went to their stations and a salute was

fired. The cook produced an extra good dinner, and we wirelessed a telegram of congratulations to the royal residence of Amalienborg.

The next day was also 11th March and also the King's birthday, for during the night we had crossed the date line. So the gun-crews returned to their stations and fired another salute, the cook cooked another extra good dinner, and we wirelessed another telegram of congratulations to the royal residence of Amalienborg.

We got answers to both telegrams.

And so *Galathea* came to Samoa, to Pago-Pago, the former American naval base that is now a real paradise, for there isn't a snake left on it. It is a lovely island with tall mountains rising steeply from the blue fjord where the oil tanks are. Small villages lie scattered along the shore. They have neat little clean straw huts with curved roofs, and a row of pillars in a circle instead of walls, and they have mat curtains which they pull down between the pillars when a storm comes. It was here that the ship's captain tried to purchase an outrigger canoe. It belonged to the local chief, and the skipper thought it would look very nice sailing on Roskilde fjord where he has a little house for the summer. At first the chief did not wish to sell, but the bargain was clinched when Captain Westergaard offered one of his junior officers as husband for the chief's middle daughter. The junior officer of course had no say in the matter, but in the end matters were satisfactorily arranged, and when *Galathea* sailed away it was with her full complement of officers and the outrigger canoe.

We also had with us a company of Samoans whom we had promised to take to Swains Island in the north. Swains Island is a flat, low coral island with thousands and thousands of coconut palms all owned by well-to-do Samoans. The little company sat on deck and played and sang. Then suddenly four other grinning faces appeared, four stowaways with guitars and straw mats under their arm. Samoa was then well out of sight. The stowaways were wanting to go to Hawaii where Samoans are much sought after for the hotels in Honolulu, where many of them dance characteristic Samoan dances which are said to be wilder and more violent that Hawaii's own hula-hula. Great was their disappointment when they discovered that the ship was going to Swain's Island to put the others ashore, and still more so when a telegram came from the American governor telling us to put them ashore there too. It is not every day that ships put in at Swains Island, and heaven forbid, but they might have to work on the plantations.

Having done her duty at Swain's Island *Galathea* sailed on northwards. There was no more fishing now, no stopping to measure depths and temperatures, for there was no more money than what would just take us home.

* * * * *

There are many places in the world where the sun pours down and gentle breezes whisper in palm trees, where the sea is dazzling blue and the natives have brown skins. Charm and improvidence and a carefree life are to be found on most islands in the Pacific.

Central America, South America, certain parts of the Mediterranean coastline and various places in the east can still in this twentieth century offer the romance that most of us must be content to find in novels and films. The one word which sums up all our romantic longings for sunshine and lagoons is Hawaii. That stands for it all and there it was ahead of us.

It is typical that the most common flower of the tropics, the hibiscus, is called the Hawaiian rose on the island, despite the fact that it grows behind the negroes' tin shanty in Jamaica or in Liberia, and acts as a hedge round the bungalows of the planters of Java, Malacca and Brazil. In fact, there is a belt of glowing red hibiscus girdling the world between the southern and northern tropics, but none the less in Hawaii they call it the Hawaiian rose. And it isn't even indigenous to Hawaii, but was brought there by the Polynesians from Tahiti or Samoa.

In the ordinary course of events Hawaii is not for us, for Hawaii is in the Sandwich Islands and the Sandwich Islands belong to U.S.A. and so you have to have dollars there, and who has any of those? *Galathea* had to go there to get fuel oil, but *Galathea* was not just an oceanographic expedition's ship from some little country in Europe, but was a ship that had found life at the bottom of the Philippine Trench and so we were news, and they put down the red carpet for us.

There was a time in the very early days when the missionaries took offence at the original form of the hula. They forbade the faithful to dance the old dance. At the same time they persuaded the women to cover

their shameless nudity with the so-called Mother Hubbard, a sack-like and dreary garment extending from neck to feet. They also forbade the young men to practise surf riding, for that took their minds away from spiritual things. But then there came other white men whose points of view differed from those of the puritanical missionaries. Sailors came, and whalers and traders, and after them tourists, and these white men dressed themselves in bright colours, stripped to the waist and walked about the sand with sinfully bare legs, and the natives began to leave the strict fold of the missionaries and go back to singing their songs and dancing their dances, while the young men brought out their surf-boards again. But the atmosphere in which the American tourists like to live there is the result of marrying Hawaii with Hollywood, and though the young girls still waggle their hips, their torsos are sufficiently covered that Mr. Babbitt and his wife can, with a good conscience and a slight thrill, enjoy life in that zone of moderate sinfulness where nobody sins very gravely.

Hugo von Platen Lüders was born in Denmark and he was sixty-nine. He had lived on Hawaii for thirty years, and was married to an elegant Hawaiian lady of the finest blood. He was not a beachcomber nor a millionaire, nor otherwise romantic, but a business man of the type that must always be trying or doing something new. He had the temperament and imagination of an artist, but unlike most artists he had them under control and made them work for him. His friends called him Van because of the von in his name. How he landed up on Hawaii is a long story and one that I shall not tell here.

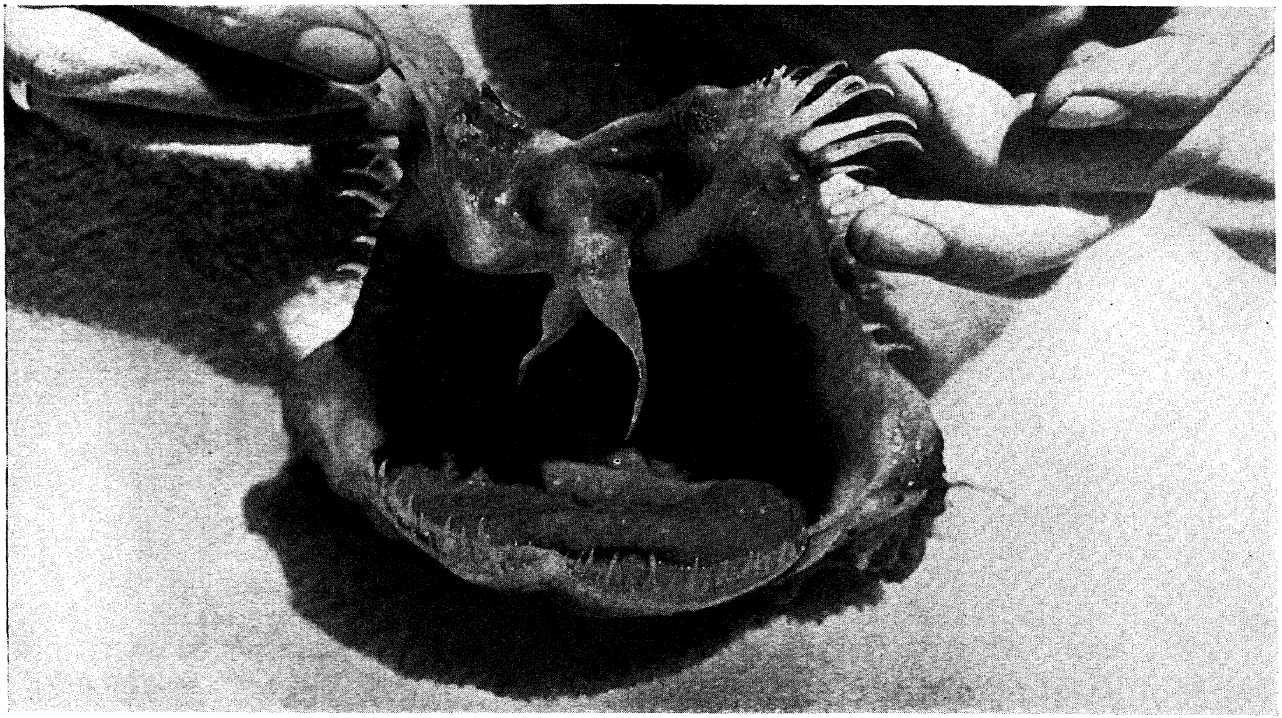
There are not many white men on the island who know as much about the native population as did Van. I don't mean knowledge of history, anthropology or that sort of thing, but knowledge of the way people think and feel. Being linked by marriage to the Polynesian race, Van was not regarded as a stranger. He was one of the family, and their conception of family was not our relatively restricted one, but covered blood relationships of umpteen removes and as good as included the entire population of the island. Van, in fact, was a combination of father-confessor and family solicitor for the whole town, and when he drove out into the country he was continually being stopped by those who required his opinion. I drove with Van all round the big island and I could not have had a better guide.

The Hawaiians are Christians. They have been for a century and a half. But, as in practically all other parts of the world to which the white man brought his religion relatively late, you will now and again see something of the paganism of the old days popping up again in the most unexpected ways.

Some months before our arrival Van lost his left eye. Of course, both he and his doctors knew why the eye had to be taken out, but the Hawaiian members of his family were not content with the purely medical explanation. They had, in fact, long been expecting something of the kind to happen. Van happens to be interested in Hawaiian antiquities, and will indulge in a little amateur archeology whenever he gets the chance. One day he had come home with a dried mummified arm which had distinct traces of tattooing. It was from

one of the old tombs in the caves which you find along the coast. Kings and nobles were buried in those caves with all their precious belongings, and then the mouth of the cave was closed and people did their best to forget where it lay as soon as they could. But the white man is too inquisitive, and is not above desecrating an old grave or tomb. On that point Van is as white as anybody. His family was terrified when he brought that arm into the house, and for months they went about expecting a volcanic eruption or an earthquake that would swallow the house and all of them in it, or a tidal wave or a stream of lava or something unexpected like that. It was not till Van lost his eye that their anxieties were to a certain extent stilled. The gods had been kind and directed their vengeance against only the sinner himself. But that was not to say that they would always remain in the same frame of mind, which was why the family rose up in arms a month or two later, when Van came home and told them that he had found a strange round stone which he was sure had been used in some pagan ritual in the old days. Van is still fighting to be allowed to bring that stone home, but so far it lies where he found it, under a bush.

Hawaiian blood still has a thickening of paganism, and it seems to flow a little more slowly than other blood. A people which, throughout most of its history, has spent its time bathing in sea and sunshine, which has been accustomed to obtain its food without great effort, and which has never had any need to protect itself against wind or weather, cannot be expected to possess the innate energy that compels less favoured races to struggle restlessly through life and to invent high-



One of the curious creatures that came up in the trawl from the bottom of the Gulf of Panama. The two long protuberances are light organs; the fish itself is a toadfish

Part of the results; some of the samples and specimens being got ready to be sent home

sounding phrases about the blessing of work for their comfort. Yet this desire of the Hawaiians to do nothing and enjoy life is not accompanied by any backwardness in mental development. The Hawaiian is intelligent and interested in most things. Amazing as it sounds when you know the slender demands the Hawaiian makes on the surroundings in which he has to live his daily life, nearly all those of Hawaiian descent can both read and write. The figure for illiterates over twenty-one is only 4.2 per cent. among full-blooded Hawaiians, and 1.0 per cent. for those with mixed blood. Again English must still be regarded as a foreign language, yet there are only 10 per cent. of Hawaiians over ten years of age who cannot speak it. Naturally a certain number of them have let themselves be infected with the ambition and energy of the immigrants, and these have gone far in many different fields. The Polynesian is quite intelligent enough to compete with other races on an equal footing.

On the whole, however, there is quite a lot to justify one drawing comparisons between the position of the Hawaiians and the Red Indians. It would seem that the problem of the pure-blooded Hawaiians can only be solved in one way, and they have already gone quite a distance in that direction without any assistance from science or planning authorities, just with a little help from a small chap with wings on his back and a bow and arrow in his hand.

CHAPTER XII.

We left Honolulu at midnight. A day or two later the weather had become colder, unpleasantly colder, and sweaters and warm coats were brought out. One of the crew got a dreadful cold, and another took to his bunk with laryngitis, but nobody had time to worry about them, for Sir Anton was also ill.

Our two doctors stood conferring round his tank in the stern. One was the ship's doctor, Dr. Ferdinand, and the other, Dr. Vilstrup, who had come with us as a zoologist, but in private life was an ear, nose and throat specialist. Our sea-elephant from the antarctic had grown soft in the tropics and could not stand another change in climate. The diagnosis was inflammation of the lung, and Sir Anton was given penicillin and daily bulletins were issued.

Then Sir Anton's state became critical and we had to get in touch by wireless with professors and veterinary experts in California. The patient was moved from the cold deck to the officers' bathroom where there was central heating which could be turned on. The officers were unable to bath, but who worried about that? In fact, the whole of that part of the ship stank like a pigstye, but what did that matter compared with the wellbeing of Sir Anton, who lay there on the floor of the

bathroom, whimpering apprehensively. He wouldn't eat; he just lay there and looked anxiously at the doctors, with shining, feverish eyes. The penicillin treatment was continued.

When *Galathea* sighted the seal rocks off the Golden Gate, it seemed that there was a slight improvement in the patient's condition. He raised his head and listened, and when he heard the roar of the sea-lions from the rocks he himself uttered a roar, and the news of it spread like wildfire through the ship.

After that Sir Anton quickly recovered, but by the time we reached Los Angeles he was ill again, this time with tummy trouble. Continual changes in diet together with the whims of the climate had had a bad effect on our sea-elephant's state of health, and after a council of war and an exchange of telegrams with the Zoological Museum and Zoo in Copenhagen it was decided to spare Sir Anton the heat of the Panama Canal and the Caribbean Sea, and to have him sent home as air freight. That would mean that within two or three days and nights he would be able to be made comfortable in a nice cold swimming pool and a comfortable chilly atmosphere.

That decision was the reason why the first question we asked our Danish Consul when he came aboard was how one sent a sea-elephant by airmail. None the less, this was soon arranged, and one evening Sir Anton was driven out to the airport escorted by Dr. Vilstrup and a string of press photographers. At eleven o'clock the 'plane took off and disappeared eastwards across the sea of light of that fantastic straggling city, Los Angeles.

The next morning Dr. Vilstrup was on the telephone from New York. Sir Anton was dead.

Vilstrup had had a dreadful night. The moment the pilot began to warm up his engines, before the roaring 'plane had even started off down the runway, Sir Anton had been terrified. He had hammered tail and fins against the sides of his cage until Vilstrup had been afraid that he would injure himself. Then he had obtained the pilot's permission to let Sir Anton out in the freighter's cabin. But that did not calm Sir Anton. He wriggled across the floor, round and round in a frenzy of panic. At 12,000 feet the temperature was pleasant, 15°-18° Centigrade, which should not have troubled him in the least. Over the continent, however, the 'plane came into a belt of disturbances. There was a storm and a lot of bumping in air pockets, which became so violent that the pilot ordered Sir Anton back into his cage. In the cage Sir Anton became quite wild. He refused all food and drink, and struck out round him on every side. Dr. Vilstrup tried everything to comfort the terrified animal, and at intervals attempted to keep his nose wet with a cloth. The 'plane got through the storm and prepared to land at Kansas City at four-thirty. Just before it landed Sir Anton at last became quieter. He lay at the bottom of his narrow cage breathing heavily. His strength was exhausted. His heart had been unable to stand up to so much fear of the unknown and he died before the 'plane touched down. We who knew Sir Anton could well understand what Dr. Vilstrup must have felt.

You may still see Sir Anton if you go to the

Zoological Museum in Copenhagen. You will find him there—stuffed.

While we were in Los Angeles we received an invitation from Professor Claude ZoBell to go and visit his scientific institute at La Jolla, where he was continuing his experiments with the deep-sea bacteria we had fished out of the Philippine Trench for him.

The bacteria were flourishing. ZoBell kept them under an artificial pressure of a thousand atmospheres which corresponded to that to which they had been accustomed when living seven miles down, and in a temperature that was exactly the same as that at the bottom of the Philippine Deep—2° Centigrade. ZoBell was enchanted with his charges. He had taken microphotographs of them and written learned papers on them in the scientific periodicals. And what is more, he had been given £25,000 by the Government to continue his experiments. Bacteria under pressure, you see, have something to do with oil, and oil has quite a lot to do with re-arming and warfare. And for that you can always get money for scientific experiments.

ZoBell's laboratory came under the big Scripps Institute, California University, which was started by the Scripps-Howard publishing concern. There was a whole little community built up around the laboratory buildings which stand out on a headland from which a long and very solid landing stage juts out into the Pacific. From the end of the landing stage a number of pipes run to the Institute, and through these salt water is pumped for the aquaria and experiments. All along the stage are numbers of instruments for registering

temperature, humidity and salinity of the atmosphere, and other such matters in which scientists are interested. At the same time they had set up numbers of plates made of metal and wood which were being used to test the resistance of paints to salt spray. That little job was being done for California's aeroplane industry. Up and down the beach and in and out of the water drove two large amphibian boats painted bright red and equipped with echo-sounder and other refinements. These were used for purely local investigation and research. As we stood and watched them, we felt very much the poor relation; and even more so when ZoBell happened to mention that his Institute received an annual grant of £700,000 plus various other subsidies for specific objects, like that recently given him for his deep-sea bacteria.

Galathea put into La Jolla and picked us up, and so we set sail southwards for our next bunkering station, Manzanillo in northern Mexico.

While we were in Los Angeles we had taken the precaution of obtaining a very vaguely-worded letter from the Mexican Consul there allowing us to undertake scientific collections on Mexican territory. The picture the Consul no doubt had in his mind's eye was that of funny men with butterfly nets and small glass jars. But none of us then had imagined that we would try to stretch the wording as far as we actually did. It was Dr. Bruun who suddenly remarked when we were at sea again after a lightning visit to San Diego:

"There are sea-elephants on San Benito."

It was an idea. The sea-elephants on San Benito

would be accustomed to the heat. Neither the Panama Canal nor the Caribbean would worry them. We fetched the chart and studied it. San Benito lay right on our course.

Current and wind were against us. We had reckoned on reaching the group in the afternoon, but when the sun went down they were still a mere shadow on the horizon. And when our anchor dropped off the middle one of the three, it was so dark that we had to use both echo-sounder and radar to find the anchorage.

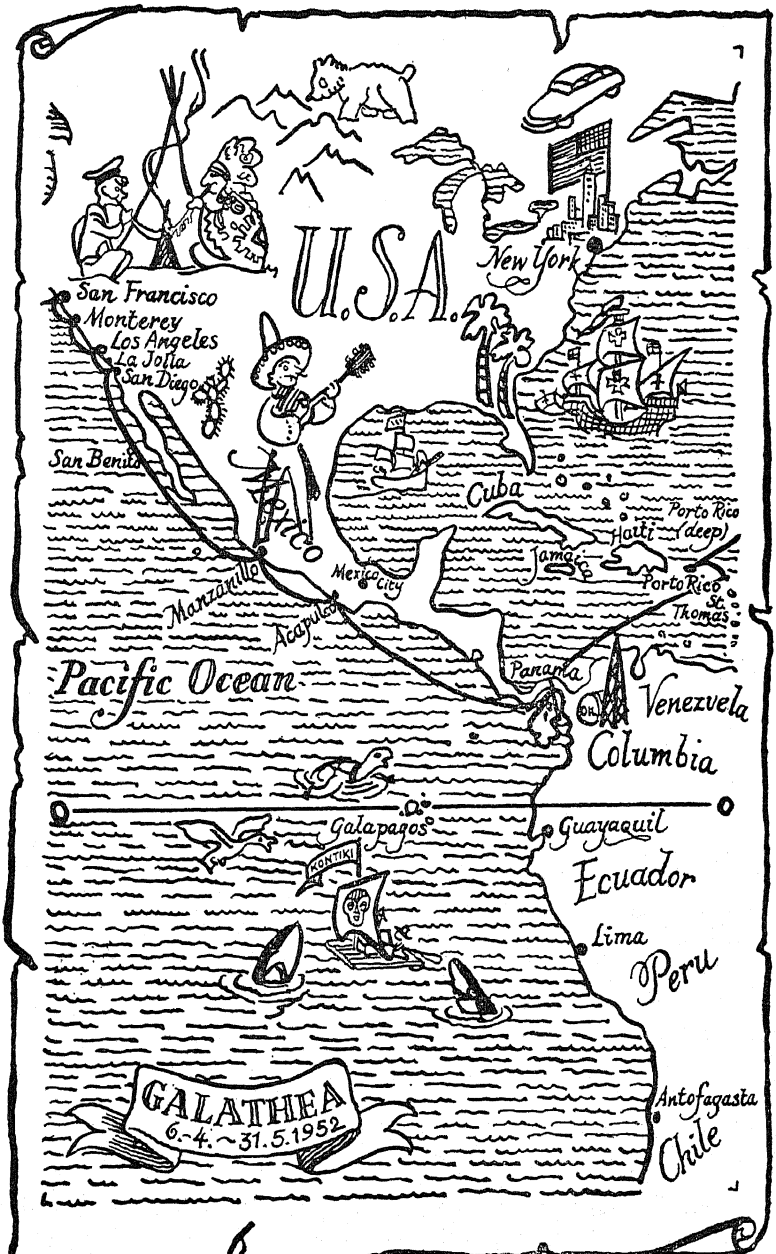
We did not know much about San Benito, and the sailing directions gave little information. We did not feel altogether comfortable, for there between the anchorage and the shore was a lantern bobbing up and down. It did not look as though it could belong to a big ship, but perhaps she was one of the small patrol vessels of the Mexican navy. What would they say to a foreign naval vessel sneaking in unannounced to their territorial waters by night? And what would they say if we came rowing past in our rubber dinghy, Moses, with a roaring sea-elephant on board?

The motor-boat and Moses were lowered into the water and manned. Half of us thought it was madness to think of trying to land on a rocky coast you did not know in the pitch dark, even though there was no wind and the sea apparently calm. But the other half was firmly determined to make the attempt. A final request to be granted the extra few hours till dawn met with a decided "no" from the commander. If we wanted a sea-elephant we were to get it then. The voyage would

be resumed in two hours' time exactly. So our little expedition set out into the dark making for the light of that other mysterious boat. When we were within a dozen yards or so of the lantern, we could see that she was not a naval vessel, but a fishing cutter.

There she lay, pitching gently on her anchor chain, in a swell that was not by any means as slight as we had thought when looking at it from up on *Galathea's* deck. There wasn't a sign of life on board the cutter. We called to them. We called to them in English, in Danish, and in what we thought was Spanish. There was no answer. We sailed right in under their stern and shouted at the tops of our voices, but still there was no sign of life. Was it a trap or was it a dead ship? With corpses in the hold? We held a swift council of war, and it was decided that Torben should board the ship and try to solve the mystery. If there was anybody alive on the boat and he was not immediately killed, he was to try and obtain information about the best place to land on the island, and where we would have the best chance of finding sea-elephants. We saw Torben disappear down the ladder to the cabin, then there was absolute quiet. For a number of seconds, each of which felt like half an hour, there wasn't a shot, not a sound.

"Who's to be next?" asked the officer in charge, looking round at our little company of sailors and scientists, rather like a pirate chief considering who next shall walk the plank. However, before any decision was taken, a flickering light was lit in the cutter's wheel-house, and we could see Torben's head bent over


U.S.A.
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San Francisco
Monterey
Los Angeles
La Jolla
San Diego
San Benito
Mexico
Cuba
Haiti
Porto Rico (deep)
Jamaica
Porto Rico
St. Thomas
Manzanillo
Mexico City
Acapulco
Pacific Ocean
Panama
Venezuela
Columbia
Galapagos
Guayaquil
Ecuador
KONTIKI
Lima
Peru
GALATHEA
6.-4. – 31.5.1952
Antofagasta
Chile

a chart alongside another swarthy face with a black moustache and a broad grin.

They had been lying asleep and snoring their heads off when Torben came below; but, when he had managed to shake life into them, it had transpired that one of them spoke excellent English, which was a great help. He confirmed that there were plenty of sea-elephants. They lay on the rocky shore just off the anchorage, and by daylight it would be nothing of a job to run a dinghy ashore right in amongst them. But now, at night—could we not wait till dawn? That, unfortunately, was just what we couldn't do, and so we chugged slowly in towards the shore.

The lantern disappeared and became a dancing pin-point astern.

The outline of a little, rocky island appeared to starboard. Waves were breaking white over some rocks. Suddenly we were in among a confusion of long, snake-like kelp, a certain sign that there were submerged rocks in the neighbourhood. Hard to starboard. Kelp again. Something moved in the water just beside us. A dark, smooth body that turned over and emitted a barking roar that made us all jump. So there were sea-lions as well! They twisted and turned playfully round the motor-boat, stuck their heads up and stared at us with glowing eyes when we turned our electric torches on them. There was much snorting and barking and splashing. Then our torches changed direction and pointed ahead. We had heard sounds in the darkness, disquieting sounds, the roar of breakers. The beam of the torches struck something white, the white of water

breaking over rocks, and in the roar of the surf we could distinguish other sounds, sounds that we remembered from Campbell Island, the belching roar of irritated sea-elephants.

There were numbers of sea elephants. They answered each other from various directions. The sea-lions in the water joined in in the discussion and every so many seconds came the roar of the breakers, the thundering roar that is followed by the swishing, rustling sound of water being sucked back across pebbles. Now we didn't dare take the motorboat closer in. Moses was manned and moved off towards land.

The surf was now no more than twenty yards away, and the roaring of the sea-elephants filled our ears and gave a very dramatic character to the situation in the pitch darkness. Back and forth Moses went in search of a hole in the white wall of surf. For over an hour we rowed, but our torches could never find an opening through which we could pass. Then it occurred to us that we did not need an opening.

It was a warm night and the water was tepid. What did it matter if we got a ducking? We could land anyway. So we could have, but there was a snag: how would we ever get Moses out through the breakers if there was a sea-elephant weighing a ton or two lying tied on the bottom. Moses would fill at the first tip, and then we should have to start all over again.

So there we lay, twenty yards from the shore, inhaling a stench like that in a byre, and listening to the roaring of hundreds of sea-elephants. Tantalus could not have suffered more than we did that night. But

then the time we had been allotted came to an end. Our officer looked at his watch and summoned Moses back.

Galathea sailed on southwards, and on 27th April, put into Manzanillo to bunker.

Manzanillo has oil, but that is about all it has. It is a poor town in poor surroundings set among naked mountains and scorched by a burning sun that shines out of a shimmering blue sky. It is Mexico just as one had imagined it, as one had read of it in Steinbeck's lovely story of the pearl. The Mexico that saunters so heedlessly through life despite its glaring contrast between rich and poor. How irritating it must be to the Americans to travel through that Mexico and see how little their civilization and way of life has caught on with their neighbour, despite the centuries that they have lived next door to each other. In fact America has had far more influence on European ways and life, especially since the war. Explain it who can; far greater changes have been wrought in Denmark within the last ten years than in Mexico during four centuries.

It was Sunday morning, and all the bells of Manzanillo were ringing with exactly the same rhythm and the same notes as they do in the small towns of Spain. It sent my mind back across the Atlantic to Andalusia, but when I looked at the men on the quay and the young girls, who, being inquisitive, had taken their Sunday walk down to the harbour to look at the queer foreign ship which had come in, it was only too obvious that I was not in Spain. Their complexions were too dark. There was Indian blood in those veins.

The girls walked along arm in arm with long, black pigtails hanging down their backs, glanced slyly up at our white sailors, looked down again and giggled. The men stood there all as solemn as the grave, with broad brimmed sombreros of straw on their coal-black hair, with long, flowing moustaches and narrow trousers, and the inevitable *serape* folded across their shoulder like the poncho of the South Americans.

The vultures had returned. We hadn't seen them since we left the Far East, but now they were again hovering over the roofs or slowly gliding with their naked necks outstretched as their horrid eyes searched for refuse in the streets and back yards of Manzanillo.

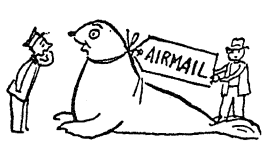
Manzanillo has a naval base, and there too, things were a little different. Inside the naval area the ordinary seamen lived in straw huts together with their families, and the sentry at the gate had bare feet.

We went hunting in the covered market and came home with many decorative earthenware jars, *serapes* and other strange things, which had cost very little money. *Pulque* sellers cried their fire water on the streets; fat women smacked tortillas between the palms of their hands and baked them on charcoal braziers in the plaza; black-eyed little boys sold us tepid orange juice, and the Danish Consul gave us dinner in the pavement café. We ate a *chili-con-carne* that skinned our insides, but luckily our Consul also dealt in the local beer, and so was able to put out the fire he had wittingly or unwittingly started.

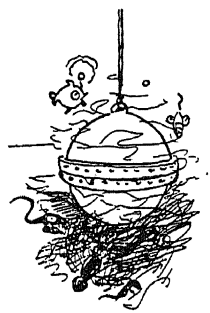
When *Galathea's* tanks were almost full with Mexican oil the Consul came aboard with his wife and children

and brothers-in-law and sisters-in-law. He sampled our Danish beer and our Danish equivalent of his *tequilla.* And then suddenly his wife asked if we had a piano on board. We had one down below in the men's quarters, where some of them were comparing their purchases and others indulging in a siesta. These latter all woke up when they saw the invasion, and even more so when they caught sight of the Consul's young unmarried daughters. Then their mother sat down at our baby piano, and she had not played many bars before even the most unmusical of us realized that we were in for a treat. It was a real concert we were given—Chopin, Bach, Beethoven, Stravinsky, Ravel, and when she had finished we stamped our feet and called for more. Nor did we need the Consul to tell us that before her marriage his wife had been one of the most famous concert pianists in Mexico. But then Madame began playing Mexican tunes. Her two young daughters suddenly kicked off their shoes and danced out in a wild folk dance with fingers clicking like castanets.

If only all Consuls could deal in beer and have daughters who danced like that.



CHAPTER XIII.



We sailed along the coast of Central America, practically never out of sight of land by day or lights by night. There was plenty of traffic, for the Panama Canal draws ships to it from all the harbours of the Pacific coast. Early one morning we too rounded Cape Malo and put in towards the narrow isthmus of Panama. We were to go in to bunker, and then out into the Gulf to work. There was deep water off Panama, and it had been agreed long before that this was where the "spherical members" of the expedition were to come into their own. That reminds me that I have never explained about those mysterious metal spheres that had sailed with *Galathea* from the very start. They had nothing to do with zoology, but with the magnetism of the earth. If it should occur to you that you neither know nor understand anything about the magnetism of the earth, there is no need to despair, for even our famous Professor Niels Bohr is quite unable to tell you or anybody else where it comes from.

Man has been familiar with the effects of magnetism for a long time. When Columbus started on his famous voyage he had a primitive compass on board, though he had no idea why it behaved as it did, and many problems of that voyage were enhanced by his doubts caused by the movements of that otherwise

reliable needle as the ship moved westwards. He knew nothing of variation, about how the magnetic North Pole shifts in relation to the geographical North Pole, and he did not have the tables that those who navigate to-day have to help them.

It was an Englishman, Gilbert, who later discovered that the earth is itself a large magnet, and also that the poles of the compass needle are repulsed by poles of the same "sex" while they are hopelessly attracted by those of the opposite "sex". Later generations constructed apparatus that was better able to measure the force of magnetism than the early crude compasses. Measuring instruments were invented which could move both in a horizontal and a vertical plane, and it then transpired that while the sailors' compass needle always remained horizontal wherever he was, the needles of this sensitive measuring apparatus dipped lower and lower towards the ground the nearer it went to the Pole, and finally stood vertical at the magnetic pole itself. The only place where the sensitive needle lay horizontal was on the earth's magnetic equator, which runs a little differently to the geographic equator by reason of the different position of the north and south magnetic poles.

Magnetism is a remarkably unstable thing to work with. You cannot even rely on the Poles. They move a fraction to the side every year, and with them the magnetic equator also moves, not much, but just sufficient to give navigators and physicists a headache. Measurements showed that the earth's magnetic force was not of equal strength all over the globe: it was strongest at the Poles and weakest at the Equator.

That is about all that is known about the magnetism of the earth, but there still remains that irritating and unanswerable question: where does it come from? Did the Creator amuse himself by drawing a giant magnet along the axis of the earth before he modelled our sphere round it, so that there was a magnetic North Pole at one end and a South Pole at the other? Or is it the core of the world itself which is magnetic? It has been calculated in theory that this core probably consists of three of the metals which are best able to be magnetized—chromium, nickel and cobalt. These are the metals we use in dynamoes, electric motors and compasses. But when they are heated, it has been discovered that they lose their magnetic qualities at 700°-800°, and we know that the temperature in the earth's core is considerably higher than that.

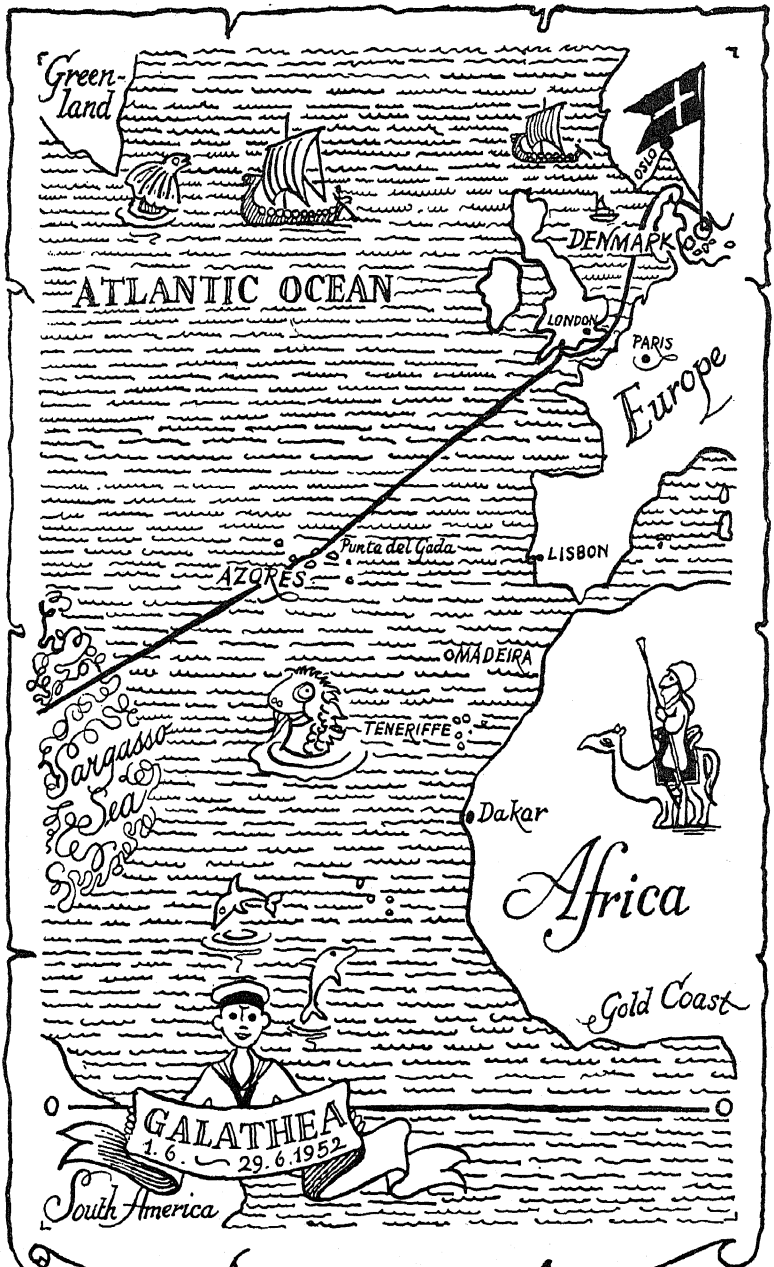
People have measured the strength of magnetic fields for four hundred years, and the results, if one is to be quite honest, have been more confusing than helpful. We have learned how to find deposits of ore and landmines with the help of magnetic measuring instruments. But we still don't know whence the earth gets its magnetism. In 1947, the famous British scientist, Professor Blackett, put forward a whole new theory which was that heavy bodies, when they rotate, will create a magnetic field around them. If they rotate regularly on an axis they will become magnetic in the direction of the axis. Now the earth is a heavy, rotating body whirling round on an axis, so perhaps the magnetism of the earth had arisen as a result of this rotation. The theory sounded plausible, even though it had its weak points. But it was sufficient to arouse

very considerable discussion and to divide the world of science into two camps.

If the earth's magnetism was due to the rotation of the earth itself, then probably the magnetism would be strongest on the surface and would decrease the farther one went towards the centre of the earth. That should hold, if for no other reason than that the surface is a far larger area than are the inner layers of the earth. It is like an onion: the more skins you peel off, the smaller is its surface.

With the sensitive measuring equipment that we possess to-day, it should be possible to measure the strength of magnetism at various depths. But to obtain any proper results sufficient to confirm or refute Blackett's theory, it was necessary to go down at any rate a couple of miles. Attempts had been made in deep mines, but these had not been very successful. In the first place, mines contain ores where there are metals that interfere with magnetism and deflect sensitive needles from the job in hand. And then even the deepest coal mine is not really deep enough. It was just at the time when science was very busy with the Blackett theory that it was announced that *Galathea* was going to work in the deepest places of the ocean, and when Dr. Bruun asked if there were any task of physics which the expedition ought to include in its programme, the committee was at once asked to make room on board for two physicists and instruments which would try to measure the magnetism of the earth at the bottom of the greatest depths.

This was pioneer work, and it fitted in well with the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Sargasso
Sea
Dakar
Africa
Gold Coast
GALATHEA
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29. 6. 1952
South America

rest of our programme. If we could get instruments for measuring magnetism sunk to a depth of ten kilometres, there would be a chance that the expedition might provide the answer to a question that had puzzled the scientist for centuries. It was, too, a field in which Denmark was especially well equipped to undertake research, for the former director of the Meteorological Institute, Dr. D. la Cour, who died in 1942, had left a number of ingenious instruments for measuring magnetism of his own construction, and a staff of assistants who knew how to use them.

There still remained one or two practical problems to be solved. In the first place these instruments called for a winch stronger than oceanographic vessels usually had, and a steel wire long enough to reach the bottom and strong enough to raise heavy instruments from it. This meant a wire some eight miles long with a breaking point of ten tons. And we also needed an echo-sounder capable of giving an accurate profile of the sea floor eight miles beneath the ship. Such a thing did not exist as the ordinary mercantile vessel was not interested in such depths. These things were all obtained one after the other. A winch was made and the Danish firm of Jac. Holm og Sønner made the wire in one piece without splicing, while in England Kelvin & Hughes made us a special echo-sounder capable of reaching the depths we required. What the physicists now required was a container in which to send their instruments down to the bottom of the Philippine Trench. This had to be non-magnetic and capable of withstanding a pressure of a thousand atmospheres, which is asking a lot of a hollow metal container. The most suitable metal, of

course, would have been steel, but being magnetic, there was no question of using that. Bronze was the answer, because it is entirely unmagnetic, but then all bronze alloys were so soft that the pressure at the depths we required would have squeezed any container made of them flat. We asked metallurgists and manufacturers in Sweden, England and U.S.A., but nobody could suggest any solution. Then the members of the Danish firm of Poul Bergsøe & Søn put on their thinking caps and produced an entirely new metal, Galathea bronze. Theoretically it was just what we required, non-magnetic and as strong as steel. But there was no means of testing it, for nowhere in the world was there a pressure chamber large enough to subject a sphere with a diameter of one metre to a pressure of a thousand atmospheres. The only pressure chamber we should be able to use was the bottom of the Philippine Trench. With this metal two different apparatuses were cast; one, a single sphere in two halves joined at the centre by a number of long bolts; the other, a double sphere, the two being joined together by a hollow rod, making the apparatus look like a weight-lifter's weight. Then a special bronze wire was made to keep the spheres at a suitable distance from the steel wire.

The single sphere was sent down once to a depth of a thousand metres during *Galathea's* trial run to Sogne Fjord in Norway, but it let the water in. Experts from the firm that had cast it pounced on it as soon as *Galathea* got back, and when she sailed on 15th October, both spheres were in their places in the special rack that had been built to hold them.

There were ingenious instruments to go inside those spheres. There was a clockwork arrangement which wound strips of paper that was sensitive to light, and there was a little electric lamp mounted on the apparatus which wrote on the paper like a pencil with a very thin beam of light, so that when the sphere was brought up to the surface the paper could be developed in the ship's dark room and the measurements read off. So at least we hoped.

The sphere went down for the first time in the Gulf of Guinea. There were no instruments in it; we just wanted to see if it was water-tight, which it was not. On our way round Africa the single sphere was sent down sixteen times and the double sphere twice. There were continual adjustments to be made, and telegrams were continually being exchanged between *Galathea* and the makers at home. But whenever one problem had been solved, another seemed to arise somewhere else. There were climatic conditions to be taken into account. The dampness in the atmosphere affected those excessively sensitive instruments. It was almost impossible to avoid their bumping against the side of the ship if they were put out in the least swell, and none of the oceans were ever really absolutely dead calm. Then there was the question of the sphere rotating at the end of its long wire, and of the pendulum motion caused by the movement of the ship.

People began to get a little tired of these spheres. The hydrographers called them the most expensive water containers in the world. The zoologists spoke pointedly of loss of precious time, and the people on the

bridge remarked casually that they were growing tired of playing yo-yo. The spheres became more and more fantastic in appearance. In the end the single sphere was going down in a sort of crash helmet made of a motor car tyre, with wings out at the side like a weird aeroplane, and a thing like a rudder, all of which were intended to prevent it bumping, swinging like a pendulum, and twisting round and round.

Then they put a different instrument into the sphere. It had nothing to do with magnetism, but was to record how the sphere behaved far down in the deep. That taught us a lot. Then they overcame the problem of keeping the sphere watertight. Then it came up safely from the bottom of the Philippine Trench, so Galathea bronze had stood the test. There had been a pressure of 15,000 tons on the sphere's surface down there.

However, whenever we thought that we had got the thing down without a bump or other disturbance, we discovered that something had happened inside. Either the self-starting mechanism had gone on strike, or the light pencil hadn't worked, or something else had gone wrong. It will give some idea of the pressure at those depths to say that a solid oak plank, an inch thick and a yard long, which was experimentally fixed to the wire above the sphere to prevent it rotating too fast, came up twisted like an aeroplane propeller. The viscosity of the water is different down at these depths to what it is on the surface.

In the end, however, the sphere had been stopped rotating and its pendulum swing brought under control. And it was watertight. In the Kermadec Trench we

got the first faint recordings on the narrow strip of paper. The first measurement was made at a thousand metres. Then three recordings at 5,000 metres. In the Tonga Deep conditions were apparently ideal, and the double sphere was sent down. It went down well, stayed there the requisite time, but when we began to wind in, the great winch went on strike. Then, too, the barometer began to tumble and it was almost the beginning of the cyclone season. Yard by yard the wire crept in while we anxiously watched the stars. And when we at last got the sphere in and opened it it was to find that the little pen which should have recorded the result had broken.

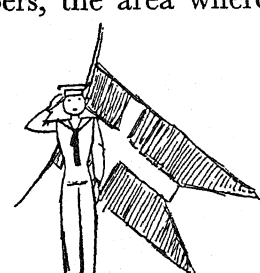
The winch was repaired in the naval workshops at San Pedro, and all the apparatus was working again by the time we reached the Gulf of Panama. The physicists were able to send their sphere down three times, and at long last they were able to record excellent results in horizontal measurement and quite good results in the vertical field. At all events the measurements were quite sufficient to show that the magnetic strength increased the further down the instruments went. That would have put an end to Professor Blackett's theory of rotation if he had not himself in the meantime, having undertaken a series of measurements to test the theory, abandoned it in its original form. Thus you may still ask where the magnetism of the earth comes from, and nobody will be able to tell you.

Soon our time was up and we sailed back to Balbao and through the Panama Canal. Before we set out on the final stage of the voyage we had one more visit to

make. We wanted to pay a visit to the island of St. Thomas which had once been a Danish Colony, and which no ship of the Danish Navy had visited since 1917 when *Walkyrien* sailed there to hand the island over to its new masters. There I met my old friend Theodor Danet, and he made me a present of a live turtle, enough for eight persons, and at the same time whispered in my ear that the best cook in the island worked at the big new hotel and specialized in turtle soup.

That evening the members of the Native Food Club dined off turtle soup in the big new hotel that has been built on the heights outside St. Thomas. It was a symbolic meal, for it was our farewell to the tropics. The orchestra played calypso tunes, the moon was rising high above the bay and beneath us lay Charlott Amalie with all its twinkling lights. We raised our dewy glasses of planters' punch and toasted each other. Then we drove back to the ship and we sailed away to Puerto Rico, there to take on oil enough for the long trip home via the Sargasso Sea, the Azores, Plymouth and the English Channel.

On the latest map of the Pacific which the big American National Geographic Society sent out all over the world to its four million members, the area where we worked in the Philippine Trench is marked as Galathea Deep. That was the first tangible international proof of the importance the world attached to *Galathea's* work, and it will not be the last.



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